



Department of Energy
Ohio Field Office
Fernald Environmental Management Project
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SEP 18 2002

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0683-02

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

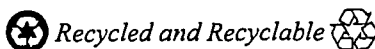
Dear Mr. Saric and Mr. Schneider:

**TRANSMITTAL OF RESPONSES TO THE UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS
ON THE DRAFT CERTIFICATION REPORT FOR AREA 9, PHASE I**

- References:
1. Letter DOE-0507-02, J. Reising to J. Saric and T. Schneider,
"Transmittal of the Draft Certification Report for Area 9, Phase I,"
dated June 10, 2002
 2. Letter, J. Saric to J. Reising, "A9,PI Draft Certification Report," dated
July 25, 2002
 3. Letter, T. Schneider to J. Reising, "Disapproval - Certification Report
for Area 9, Phase I," dated August 27, 2002

Enclosed for your review and approval are responses to the United States Environmental Protection Agency (USEPA) comments on the draft Certification Report for Area 9, Phase I (A9PI) completing the certification process outlined in the Sitewide Excavation Plan. The Certification Report will be revised upon approval of the comment responses.

In parallel with the submittal of the draft A9PI Certification Report to the USEPA and OEPA, a meeting was held with the landowner to discuss the results of the certification process. Representatives from Fluor Fernald, Inc., and the Department of Energy, Fernald Environmental Management Project (DOE-FEMP) met with the landowner on June 13, 2002 and discussed the results presented in the A9PI Certification Report. The majority of



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Mr. James A. Saric
Mr. Tom Schneider

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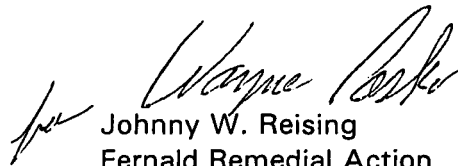
DOE-00683-02

the meeting focused on the results of the certification sampling process discussed on a Certification Unit (CU) by CU and Constituent of Concern (COC) by COC basis. At the conclusion of the meeting, the landowner appeared to understand the approach and conclusions of A9PI Certification Process. A follow-up meeting was also held between a DOE-FEMP representative and the landowner the week of July 8, 2002 to answer any additional questions.

If you have any questions or need further information, please contact Robert Janke at (513) 648-3124.

Sincerely,

FEMP:RJ Janke


Johnny W. Reising
Fernald Remedial Action
Project Manager

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SEP 18 2002

Mr. James A. Saric
Mr. Tom Schneider

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DOE-00683-02

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Enclosures: As Stated

cc w/ enclosures:

R.J. Janke, OH/FEMP
T. Schneider, OEPA-Dayton (three copies of enclosures)
G. Jablonowski, USEPA-V, SRF-5J
F. Bell, ATSDR
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
R. Vandegrift, ODH
C. Summe, Landowner
AR Coordinator, MS78

cc w/o enclosures:

R. Greenberg, EM-31/CLOV
N. Hallein, EM-31/CLOV
J. Reising, OH/FEMP
A. Tanner, OH/FEMP
D. Carr, Fluor Fernald, Inc./MS2
J. Chiou, Fluor Fernald, Inc./MS64
T. Hagen, Fluor Fernald, Inc./MS9
F. Miller, Fluor Fernald, Inc./MS64
R. Nichols, Fluor Fernald, Inc./MS7
T. Poff, Fluor Fernald, Inc./MS65-2
ECDC, Fluor Fernald, Inc./MS52-7

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**RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS
ON THE DRAFT CERTIFICATION REPORT FOR AREA 9, PHASE I
(21120-RP-0004, REVISION A)**

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

GENERAL COMMENT

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #:

Pg. #:

Line #:

Code: C

Original Comment #: 1

Comment: The data set seems to include an unusual number of "J" qualified data. Previous certification reports have not demonstrated this level of estimated results. Considering the nature of this report and the weight being place on the data, a more thorough discussion of these qualifiers is needed.

Response: See response to U.S. EPA General Comment No. 1.

Action: See response to U.S. EPA General Comment No. 1.

SPECIFIC COMMENTS

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #:

Pg. #: ES-2

Line #: 23-27

Code: C

Original Comment #: 2

Comment: The inclusion of UMTRCA within this discussion is not well justified. This legislation was reviewed in the OU5 FS and found to not be sufficiently protective thus requiring risk-based cleanup levels. To now use it to justify the proposal to not conduct remediation raises some issues. Also, the inclusion of it as an "independent point of reference" is confusing. What is DOE intending this to mean?

Response: The Uranium Mill Tailings Radiation Control Act (UMTRCA) criterion was not included in the Operable Unit 5 Record of Decision (OU5 ROD) because the UMTRCA criterion was based on impact due to a single constituent of concern (COC) or for the total radiological risk due to radium and thorium. OU5 ROD and final remediation levels (FRLs) considered multiple COCs. However, the risk levels associated with all COCs in Area 9 Phase I (A9PI), excluding radium-226, are insignificant leaving radium-226 as the single driver for risk as indicated by the certification data. From a radiological standpoint, radium-226 is 77 percent of the residual risk associated with Certification Unit (CU) 6 and 52 percent of the residual risk associated with CU 14. With radium-226 as the main risk driver, UMTRCA criteria become more applicable and were referenced as an independent source of comparison in this report. DOE's intention behind the reference of the UMTRCA criterion is to show that our conclusion is conservative, given that radium-226 is the only significant residual COC. This is consistent with how other sites under UMTRCA are handled, which helps to reaffirm the level of conservatism in the A9PI Certification decision.

Action: None.

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: 3.1

Pg. #: 3-4

Line #: 23-26

Code: C

Original Comment #: 3

Comment: The first three sentences of this paragraph are unclear. Please clarify why CU 11 did not submit archive samples and how did the results from other CUs affect CU 11?

Response: The preliminary data for CU 11 was made available at the same time that the decision was made to collect another round of physical samples in other CUs. The preliminary data for CU 11 indicated through the *a posteriori* test there were not enough data points to differentiate the mean from the FRL. Because an additional round of samples were already planned to be taken in other CUs, it was decided to include CU 11 in this second round to consolidate the sampling efforts. Including CU 11 into the second round of sampling produced 16 additional samples instead of just the four from archive. It was determined that the analyses of the archived samples were not necessary prior to the second round of sampling. Therefore, the archive samples from CU 11 were not analyzed.

Action: Revise the text to replace Lines 23 to 29 with the following:

"The preliminary data for CU 11 was made available at the same time that the decision was made to collect another round of physical samples in other CUs. The preliminary data for CU 11 indicated through the *a posteriori* test there were not enough data points to differentiate the mean from the FRL. Because an additional round of samples was already planned to be taken in other CUs, it was decided to include CU 11 in this second round to consolidate the sampling efforts. Including CU 11 into the second round of sampling produced 16 additional samples instead of just the four from archive. It was determined that the analyses of the archived samples were not necessary prior to the second round of sampling. Therefore, the archive samples from CU 11 were not analyzed. The sample results are discussed in Section 5.1. Based on the findings, no further field activity was conducted beyond the second round of sampling."

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: 4.3

Pg. #: 4-5

Line #: 33

Code: C

Original Comment #: 4

Comment: Sample identification number shows "2" as the depth indicator. Should "2" be used for both surface and subsurface depth?

Response: No. This is a typographical error and is incomplete.

Action: The text will be revised to state: "2 = Depth indicator (1 = surface for CUs 1 through 4, 2 = surface for CUs 5 through 20, and 3 = subsurface for CUs 5 through 20)"

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: 5.1.1

Pg. #: 5-4

Line #: 5

Code: E

Original Comment #: 5

Comment: Replace "teat" with "test".

Response: Agree.

Action: The text will be revised.

Commenting Organization: Ohio EPA

Commentator: GeoTrans, Inc.

Section #: 5

Pg. #: 5-4

Line #: 4

Code: C

Original Comment #: 6

Comment: The hypothesis formulation is inconsistent with the preference indicated in recent U.S. EPA guidance (USEPA 1996). This guidance indicates that it is preferable to choose the null and alternative hypotheses in light of the consequences of making an incorrect decision. The true condition that occurs with the more severe decision error (not what would be decided in error based on the data) should be defined as the null hypothesis. Given this preference, the SEP formulation of defining Ho as "mean CU concentration exceeds the FRL" should be adhered to.

Response: Agree. The Sitewide Excavation Plan (SEP) formulation of defining Ho as "mean CU concentration exceeds FRL" was adhered to in the initial statistical calculation (see Appendix A.1), resulting in the conclusion that these CUs do not pass the certification requirements as defined in the SEP. For added information, the null hypothesis test that the mean CU concentration cannot be differentiated from the FRL was performed. This was done to demonstrate that the results of the *a posteriori* test produced a necessity for collecting a huge number of samples to potentially provide differentiation between mean CU concentration and the FRL. It is likely that the mean concentration is at the same level as the FRL in these CUs.

Action: None.

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: 5.1.2

Pg. #: 5-5

Line #: 4-7 & 13-16

Code: C

Original Comment #: 7

Comment: It appears that two different tests were conducted for arsenic and beryllium as the conclusion statements are different. If this is the case, why are two different tests being used (e.g., As = Bkgd and Be < Bkgd)? If different tests were not used, then the text should be the same.

Response: The same test was conducted for both constituents (see Appendix A.2), which determined whether the COC-specific baseline confirmation results are less than the corresponding background population or cannot be differentiated at 99 percent upper confidence level. The results of this test produced two different conclusions. For arsenic, it was determined that the baseline confirmation results were statistically consistent with the background concentrations. For beryllium, the test results showed that beryllium was statistically less than background concentrations.

Action: None.

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: 5.1.2

Pg. #: 5-5

Line #: 11

Code: E

Original Comment #: 8

Comment: Delete "that".

Response: Agree.

Action: The text will be revised.

Commenting Organization: Ohio EPA

Commentator: GeoTrans, Inc.

Section #: 5

Pg. #: 5-8

Line #: 17

Code: C

Original Comment #: 9

Comment: The statement that the levels at which radium-226 is present in CUs 6 and 14 "cannot be statistically differentiated from the FRL" is misleading. The null hypothesis of the "mean CU concentration equals the FRL" is never proven to be true. It is assumed to be true until proven otherwise. The text should indicate that the stated conclusion is an assumption based on the available data.

Response: Agree.

Action: The text will be revised. Lines 15 through 19 will be revised to state:

"DOE recognizes that CUs 6 and 14 have not passed all of the criteria for certification set forth in the SEP for radium-226. However, based on the available data, the null hypothesis of mean CU concentration equals the FRL cannot be disproved. This hypothesis is assumed to be true until proven otherwise. Therefore, DOE understands that the levels at which radium-226 is present in these CUs cannot be statistically differentiated from the FRL of 1.5 pCi/g. More importantly, there is no single result that is greater than two times the FRL, which would require remediation consistent with SEP hot spot criteria."

Commenting Organization: Ohio EPA

Commentator: OFFO/GeoTrans, Inc.

Section #: 5

Pg. #: 5-8

Line #: 21

Code: C

Original Comment #: 10

Comment: Given that it may not be technically feasible to show that the mean radium-226 concentration is less than the FRL through the collection of soil samples and the performance of statistical comparisons, a potential alternative course of action might be to conduct a risk analysis to show that the observed levels of this constituent do not pose a significant risk. The FRL is a general number intended to apply sitewide. An assessment focused on Area 9, Phase I and based on the observed concentration data would be more appropriate to support the case for "no remedial actions required" than the analyses and discussions provided in the text.

A more understandable discussion of risk in Section 5.2 is necessary as well as potentially moving the data from Appendix D into this section. The entirety of DOE's argument for not conducting remediation lies on the justification of acceptable risk. A revision of the section to more thoroughly and clearly discuss the risk for the two CU's is appropriate.

Response: Agree. DOE's conclusion is that CU 6 and CU 14 have low risk consistent with the acceptable upper limit in the OU5 ROD (i.e. $< 10^{-4}$ ILCR) and remediation is not required. As a conservative approach, the exposure scenario defined for off-property conditions was based on a resident farmer as the reasonable maximum exposure (RME) receptor living in the affected area for the entirety of his/her life with the exposure pathways identified as incidental ingestion (fruits/vegetables, meats/milk), dermal contact, and direct radiation. DOE recognizes that it is highly unlikely that person will live within the confines of either CU 6 or CU 14 for their entire life, whereby further reducing the already acceptable calculated risk. Appendix D.1 will be included as a table in Section 5 of the report and labeled as Table 5-1.

Action: The following text will be inserted at the end of the last paragraph on Page 5-8:

"A risk evaluation was performed (see Table 5-1) to assess the cumulative residual risk contribution from each COC for both CU 6 and CU 14. It was determined that the risk levels were 3.5E-05 and 3.71E-05 for CU 14 and CU 6 respectively. These levels are consistent with the acceptable total residual risk of up to 10^{-4} ILCR in the OU5 ROD for multiple COCs. The acceptable risk levels defined in the OU5 ROD were based on a resident farmer as the reasonable maximum exposure (RME) receptor living in the affected area for the entirety of his/her life. DOE recognizes that it is highly unlikely that person will live within the confines of either CU 6 or CU 14 for their entire life, whereby further reducing the already acceptable calculated risk."

**RESPONSES TO U.S. ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL REVIEW COMMENTS ON THE
DRAFT CERTIFICATION REPORT FOR AREA 9, PHASE I
(21120-RP-0004, REVISION B)**

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

GENERAL COMMENT

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: Not Applicable (NA)

Page #: NA

Line #: NA

Original General Comment #: 1

Comment: The certification report does not demonstrate that the quality of analytical results presented in the report is known and adequate for certifying that soil in Area 9, Phase I (A9PI) certification units (CUs) does not require remediation. Specifically, Appendix A of the report shows that more than 95 percent of analytical results for the primary constituents of concern (COC) are "estimated or imprecise" values (J-qualified). Use of such data to conclude whether a CU contains a given COC above a final remediation level (FRL) is questionable. For this reason, complete data packages and associated data validation reports for the A9PI investigation should be submitted to the U.S. Environmental Protection Agency (U.S. EPA).

Response: The radiological data that was submitted by the onsite laboratory underwent further review by the Data Validation Section of the Quality Assurance Department after the initial draft report was submitted. This reassessment of the data identified instances that resulted in the initial misapplication of the "J" qualifier with respect to gamma spectroscopy data. It also identified one circumstance that led to an erroneous use of the "J" qualifier with respect to the analysis of technetium-99.

The main issue, relative to gamma spectroscopy, centered on the analysis of a duplicate sample versus a duplicate analysis by the laboratory for Quality Assurance/Quality Control purposes. The requirements set forth in the Sitewide CERCLA Quality Assurance Project Plan (SCQ) are ambiguous with respect to the definition of a "duplicate" (i.e., sample versus analysis) and when its use is appropriate. It has been the practice of the site that during certification activities field duplicate samples and laboratory duplicate analyses are used to determine precision of both sampling and analytical methods at a predetermined frequency. For this certification event (A9PI), the Data Validation Section interpreted that the SCQ required a laboratory duplicate sample. Although laboratory duplicate analyses were performed, consistent with all the previous certification reports, the lack of a laboratory duplicate sample in their initial review constituted a deviation from the SCQ. This was viewed as a contract deviation and not an analytical performance failure, which resulted in the initial "J" qualifier. This issue was clarified and later documented in a variance (V/FCN 21120-PSP-0003-12) to the Project Specific Plan (see Attachment 1).

One other minor issue, relative to gamma spectroscopy, was related to the observed slightly low bias in the Laboratory Control Sample (LCS) for radium-226. Although all radium-226 LCS data meet the requirements in the SCQ (i.e., 80 to 120 percent of Known Value), the Data Validation Section used 'professional judgement' to "J" qualify the radium-226 data due to this bias. The bias was previously identified in 1997 with the results from the report entitled *Comparability of In Situ Gamma Spectroscopy and*

Laboratory Data (20701-RP-0001), which among other things, compare gamma spectroscopy and alpha spectroscopy results. These results, as you may recall, indicated a low bias for gamma spectroscopy compared to alpha spectroscopy. Given that the gamma spectroscopy method was used to conservatively establish the background conditions, the gamma spectroscopy method was deemed the most appropriate analytical test for FRL attainment. Since December 2001, with the use of new standards, better containers, and new geometry, the accuracy of gamma spectroscopy has improved by several percentage points to about 94 to 95 percent, which indicates that the results from the certification of A9PI are more accurate than past certification events from other areas. By using the same method for evaluating certification data to that used in developing the FRL, the bias is recognized and does not provide a basis for qualifying the data as estimated ("J").

With this information and the issuance of the variance mentioned above, Fernald's Data Validation Section re-evaluated the data and the precision of the analytical method using the field duplicate sample and laboratory duplicate analysis and subsequently removed the "J" qualifier associated with these issues.

With respect to technetium-99, the data were initially "J" qualified based on the perceived bias resulting from the use of the same solution for the LCS and for spiking. Upon reevaluation the Data Validation Section removed the "J" qualifiers associated with this issue, as this is an acceptable laboratory method and is consistent with past certification events.

The re-evaluated data with the appropriate qualifiers have been updated into the tables of Appendix A of the report. These tables are also attached for your reference (Attachment 2). After applying the appropriate qualifiers to the data, the percentage of "J" qualified data from the on-site radiological laboratory has been reduced to ~14 percent. This level of estimated data ("J" qualified) supports the decisions as stated in the A9PI Certification Report.

In summary, there are no abnormal data quality issues and/or inconsistent laboratory analytical processes identified in the A9PI Certification Report during the entire data validation process when compared to any other previous approved certification reports.

As discussed in the July 30, 2002 Weekly EPA Conference Call, DOE feels, with the concurrence of the EPAs, that the enormity of the data packages with their associated data validation reports discourages their submittal to the U.S. EPA. Representatives from the agencies are welcome to come to the Fernald Site to review any or all data packages, which should meet the intent of this comment.

Action: Revise the A9PI Certification Report to include the updated Certification Samples, Analytical Results and Statistical Tables in Appendices A.1, A.3, A.4, and A.5.

SPECIFIC COMMENTS

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 3.1

Page #: 3-1

Lines #: 30 and 31

Original Specific Comment #: 1

Comment: The sampling depth intervals mentioned in Line 30 (12 to 36 inches) and Line 31 (6 to 26 inches) are not the same. The accuracy of information presented in Lines 30 and 31 should be verified and revised as necessary.

Response: Agree. The 1992 Background Soil Study was conducted to obtain background results from the 12 to 36-inch interval.

Action: Revise Line 31 to read 12 to 36-inch interval.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 3.1

Pages #: 3-3 through 3-5

Line #: NA

Original Specific Comment #: 2

Comment: The text does not present summary statements regarding 1) *a posteriori* test results for CUs 7 and 11 or 2) the statistical comparison of analytical results with the FRLs for CUs 2, 3, 4, 5, 9, 13, 16, 17, 18, 19, and 20. The report should be revised to include the missing information.

Response: 1) Section 3.1 discusses Preliminary Data Evaluation as the sample results were made available. An informal *a posteriori* test was not conducted on CUs 7 and 11 nor was it required. However, the formal *a posteriori* test was conducted for all CUs as directed by the SEP and is described in Section 5.1.1 under the radium-226 heading.

2) Appendix G of the SEP describes the steps necessary for the statistical analysis of the certification data. Figure G-2 shows that if all results for a certification unit for a given parameter are less than the final remediation level then no further statistical analysis will be performed.

Action: None.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 3.2

Page #: 3-6

Lines #: 19 and 20

Original Specific Comment #: 3

Comment: The text does not contain complete information on the analytical method for aroclor-1260 analysis. The certification report should be revised to include the method number in addition to the method source.

Response: Agreed.

Action: Revise text to state that aroclor-1260 was analyzed using SW846 8082.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 4.2

Pages #: 4-3 and 4-4

Line #: NA

Original Specific Comment #: 4

Comment: The text should be revised to include (1) the reference used for the method for verifying and validating organic data; (2) additional parameters examined during the verification and validation of organic data (for example, surrogate recoveries); and (3) additional data qualifiers used, as applicable.

Response: The validation process and methods are described in detail in the SCQ in Section 11.2 and Appendix D, which was approved by both U.S. EPA and Ohio EPA. These references consist of over 100 pages of text that cannot be efficiently incorporated into a certification report. However, a citation to these references is appropriate and will be included in the text.

Action: Revise text to reference the appropriate sections of the SCQ for validation methods.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 4.3

Page #: 4-5

Lines #: 25 through 33

Original Specific Comment #: 5

Comment: The text should be revised to include a complete description of the sample identification numbering system. Specifically, the term "RM" should be defined. In addition, the depth indicator field in the sample identification number currently shows that "2" represents both surface and subsurface samples. The text should be corrected to show that "2" represents only subsurface samples ("1" represents surface samples).

Response: Agreed.

Action: Revise text to indicate that 1 represents surface samples and that "RM" is an abbreviation for radiological and metals analyses.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 4.3

Page #: 4-6

Lines #: 13 through 23

Original Specific Comment #: 6

Comment: The text states that for radiological parameters, uncertainty associated with each "sample result" is indicated through total propagated uncertainty (TPU); however, the certification report does not discuss TPU. The report should be revised to include available information regarding the uncertainty associated with analytical results.

Response: Agreed.

Action: Revise the text in Section 4.3 to discuss the definition of TPU. The TPU is an estimate of the overall uncertainty associated with a measured or calculated result that has been derived from an evaluation of all factors that can influence a result, including both systematic and random sources of uncertainty. For both *in situ* and laboratory-based radioactivity measurements, factors such as the random nature of the radioactive decay process (i.e., counting uncertainty), the mass or volume of the "sample" being analyzed, the variation in radiation detection efficiency with the energy of the emitted radiation and the density and chemical composition of the sample, uncertainty in nuclear decay parameters used to convert counts to activity, and attenuation of the radiation must be considered to properly assess the overall uncertainty of the measured result. The Data

Validation Section evaluates the reported TPU as described in the SCQ in Section 11.2 and Appendix D to assess the impact on the data quality and will qualify the data as estimated if the uncertainty is excessive.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 5.0

Pages #: 5-1 through 5-10

Lines #: NA

Original Specific Comment #: 7

Comment: The information presented in Section 5.0 of the certification report cannot be properly evaluated because of the data quality issue stated above in the General Comment. The additional information requested in the General Comment should be provided for U.S. EPA to review.

Response: DOE has responded to the General Comment No. 1. Upon concurrence with this response U.S. EPA should be able to properly evaluate Section 5.

Action: None.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: Appendix A.1

Pages #: NA

Lines #: NA

Original Specific Comment #: 8

Comment: The appendix should define all abbreviations and symbols used in the tables. In addition, it should specify the statistical significance level or the normality test before determining that the data were not normally distributed and had to be transformed to test for lognormality.

Response: Agree. The following will be added to the beginning of Appendix A:

The procedure used to determine if the data are to be assumed to be either normally distributed or lognormally distributed is outlined in Section G.2.3 of Appendix G to the SEP. The second paragraph under "Step 3: Perform the Shapiro-Wilk Test to evaluate if the data are normally or lognormally distributed" states that "If the Shapiro-Wilk Test indicates both normal and lognormal distributions fit the data, the distribution with the highest p-value will be used in the Student's t-Test (Section G.2.2.2) to make the certification decision." Therefore, the distribution testing procedure is not a matter of transforming the data and then testing for lognormality only when the normality assumption fails as the comment seems to imply. The method is to test both normality and lognormality and select the distribution that "best" fits the data as defined by the test yielding the higher p-value above a minimum acceptable value. The minimum acceptable p-value for acceptance of a distribution was set at 0.05.

Abbreviations:

W-Statistic Probability – Shapiro-Wilk probability of the "better" fit – either normal or lognormal (note: a value less than 0.05 indicates that neither normality nor lognormality could be accepted, but the highest p-value is still shown.)

t-Test (N) – indicates that the normal distribution is best fit to data with a p-value greater than or equal to 0.05.

t-Test (LN) – indicates that the lognormal distribution is best fit to data with a p-value greater than or equal to 0.05.

Sign Test – the Sign test was used because one of the following situations occurred:

1. there were greater than 50 percent non-detects,
2. between 15 and 50 percent non-detects and data not symmetrically distributed,
3. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data not symmetrically distributed.

Wilcoxon SR – the Wilcoxon Signed Rank procedure was used because of one of the following situations:

1. between 15 and 50 percent non-detects and data symmetrically distributed,
2. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data symmetrically distributed.

Note: Data was considered to be “symmetrically distributed” if the Standardized Skewness had an Absolute Value of less than or equal to 2.00 (i.e., between -2.00 and 2.00).

Number of NDs – number of non-detects

@ - maximum result was below the FRL indicating that no statistical result need to be reported.

Action: Incorporate above definitions of abbreviations into Appendix A of the report.

VBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0

Page 1 of 2

PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling

4494

Date 07-31-02

VARIANCE/FIELD CHANGE NOTICE (INCLUDE JUSTIFICATION):

This Variance/Field Change Notice (V/FCN) documents the clarification of the use of duplicate analyses and duplicate samples for the gamma spectroscopy method to satisfy the ASL D precision requirements as stated in the Sitewide CERCLA Quality (SCQ) Assurance Project Plan.

The requirements stated in this PSP in section 4.0 Quality Assurance/Quality Control Requirements, as well as in Appendix A: Data Quality Objectives SL-052, Rev. 3 direct the laboratory to follow the quality control requirements of the SCQ, which are located in Section 4 and Appendix G with definitions located in the Glossary.

The SCQ uses terms like duplicate, duplicate sample, and duplicate or replicate analysis inconsistently. Therefore, to assure that proper quality control measures were taken with respect to precision, the following summary is provided:

Table G-4, Criterion: 26 for Gamma Emitting Isotopes at ASL D requires the laboratory to analyze a *Duplicate Sample* to assess precision. (see Attachment 1) A *Duplicate Sample* is defined in Section 4.1.1 of the SCQ as "*Duplicate sample analyses are used to evaluate precision of analytical laboratory performance and sample collection techniques. Duplicate samples are independent samples prepared by field sampling teams in the same manner as the original sample...*" (see Attachment 2)

By this definition, *Duplicate Samples* have been collected and analyzed at the proper frequency for this entire project and the laboratory satisfied the requirements.

The Glossary defines a duplicate sample within the definition of a *Duplicate*. Here a *Duplicate* is defined as "A duplicate may be a second analysis (or count) of the same sample (duplicate analysis) or identical analyses of two samples that were obtained from a single sample (duplicate sample)." (see Attachment 3) The *Duplicate Sample* in this definition is the underline portion of the definition.

In addition to the *Duplicate Sample* (collected in the field) the laboratory performed a second analysis (recount) of the same dried, ground, and sealed portion of the sample to assess instrumental precision. This definition of a *Duplicate* falls under *duplicate analysis* and is consistent with the guidance in Section 4 of the SCQ.

Section 4.2.1 of the SCQ entitled Analytical Precision states "A routine program of duplicate or replicate analysis must be established to assess the precision of an analytical method, instrument, or laboratory analysis... The Relative Error Ratio (RER) is used to assess the precision of duplicate measurements for radiochemical analyses. See Appendix G, Table G-4 for a definition of RER." (see Attachment 4) The first line of this section calls for *Duplicate Analysis* but the last line of this section reverts back to Table G-4, which calls for the *Duplicate Sample*.

No change in analytical processes or sample collection methods needed to take place.

Justification

The use of the *Duplicate Sample* that was collected in the field in conjunction with the *Duplicate Analysis* as used by the laboratory meets the requirements for the evaluation of precision as directed by the SCQ.

The intent of a duplicate sample is to evaluate the precision of sampling techniques, sample preparation techniques, and instrumental analysis. This is satisfied by the collection of duplicate samples in the field by the sampling team and by subjecting these duplicate samples to the same preparation and analysis as a true sample. The duplicate analysis performed by the laboratory satisfies the SCQ requirements stated in Section 4.2.1.

This is consistent with the recent Certification Sampling and Analysis that has been performed in other areas of the site.

VARIANCE / FIELD CHANGE NOTICE

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V/F 21120-PSP-0003-12

WBS NO.: PROJECT/DOCUMENT/ECDC #21120-PSP-0003 REV 0

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PROJECT TITLE: PSP for Area 9 Phase I Certification Sampling

Date 07-31-02

REQUESTED BY: Frank Miller

Date: 07-31-02

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN	DATE
X	QUALITY ASSURANCE <i>R. J. Fisher</i>	8/05/02	X	PROJECT MANAGER <i>Frank Miller</i>	8/5/02
X	DATA QUALITY MANAGEMENT <i>Frank Miller</i>	8/5/02	X	CHARACTERIZATION MANAGER <i>Frank Miller</i>	8/5/02
X	ANALYTICAL CUSTOMER SUPPORT <i>Demisey Arredondo</i>	8/5/02	X	LABORATORY MANAGER <i>Demisey Arredondo</i>	8/5/02
VARIANCE/FCN APPROVED [X] YES [] NO			REVISION REQUIRED: [] YES [x] NO		

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

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ATTACHMENT 1

FEMP-SCQ FD-1000
Appendix G, Rev. 2
January, 2002

TABLE G-4 RADIOCHEMICAL PERFORMANCE CRITERIA (Page 26 of 32)

CRITERION: 26	ANALYTICAL SUPPORT LEVEL (ASL) C & D				
ANALYTE: Gamma Emitting Isotopes ⁽⁷⁾	SAMPLE MATRIX				
PERFORMANCE PARAMETERS	WATER	SOIL/ SEDIMENT	AIR FILTERS ⁽²⁾	FLY ASH	CONTAMINATED LIQUID ⁽³⁾
Highest Allowable Minimum Detectable Concentration (HAMDC) ⁽¹⁾	4.0 pCi/L	0.2 pCi/g	10 pCi/Filter	1.0 pCi/g	10 pCi/L
Percent Overall Tracer/Chemical Recovery	N/A	N/A	N/A	N/A	N/A
Method Blank Concentration	<HAMDC ⁽⁴⁾	<HAMDC ⁽⁴⁾	<HAMDC ⁽⁴⁾	<HAMDC ⁽⁴⁾	<HAMDC ⁽⁴⁾
Laboratory Control Sample: Percent of Known Value ⁽⁶⁾	85-115%	80-120%	80-120%	80-120%	80-120%
Precision Requirements for Duplicate Samples	RER 2 ⁽⁵⁾	RER 2 ⁽⁵⁾	RER 2 ⁽⁵⁾	RER 2 ⁽⁵⁾	RER 2 ⁽⁵⁾

- (1) The Minimum Detectable Concentration (MDC) must be computed as follows:

$$MDC = \frac{4.65 \cdot [S_{BKG}]}{K} + \frac{2.71}{T \cdot K}$$

where S_{BKG} is the standard deviation of the count rate for an appropriate background count; K is the correction factor that includes units conversion and typical values for the volume or weight of sample, decay correction factor, detector efficiency, and chemical recovery; and T is the counting time of the sample.

- (2) Glass Fiber 8" X 10".
- (3) Two phase system containing about 90% Water + 10% Organic liquid.
- (4) When the concentration of a radionuclide in a sample is significantly greater than the applicable HAMDC, the Radiochemical Analysis Performance Specifications for the HAMDC and Method Blank Concentration are waived. Counts may be terminated earlier than usual provided that the one sigma uncertainty in the net count-rate of the sample(s) in question is ten percent (10%) or less. The measured result for the blank must not exceed the HAMDC or five percent (5%) of the activity concentration of the least active sample in the batch.
- (5) Relative Error Ratio, $RER = |C_1 - C_2| / [(TPU_1)^2 + (TPU_2)^2]^2$ where C_1 and C_2 are the measured concentrations for the sample and duplicate and TPU_1 and TPU_2 are the respective one sigma total propagated uncertainties. Measurements are acceptable if $RER \leq 2$. If RER is greater than 2 but less than or equal to 3, investigate the cause and take corrective actions if RER is consistently greater than 2. If $RER > 3$, take corrective actions and reanalyze the batch of samples.
- (6) Recoveries or percentages of known values which are 15% above or below the ranges listed are acceptable on an infrequent basis, e.g., less than 15% of the time. These occurrences must be investigated and explained. If more than 15% of the recoveries are outside the ranges listed, take corrective actions and reanalyze samples.
- (7) All samples must be counted for a length of time and in a geometry that will achieve the stated HAMDC for Cs-137. When this is accomplished, the Minimum Detectable Concentration (MDC) obtained for any other isotope in the spectrum will be considered acceptable, unless HAMDC requirements for other isotopes are specifically stated in a project-specific plan, sampling plan, or laboratory contract. For any gamma emitter determined to be above the respective detection limit, report the radionuclide concentration and also the MDC as determined by the equation in footnote 1.

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In the laboratory, an extract from the container is prepared and analyzed for parameters of interest. Container suppliers provide QA certification information on batches of pre-cleaned containers if requested. In some cases, additional container blanks may be necessary. Container blanks may be necessary when unsealed containers are used, container custody seals and associated documentation is not available, or locally cleaned containers are used. Use of container blanks is appropriate for ASLs B, C, D, and E analyses.

Duplicate sample analyses are used to evaluate precision of analytical laboratory performance and sample collection techniques. Duplicate samples are independent samples prepared by field sampling teams in the same manner as the original sample. They are collected as close as possible to the same point in space and time as the original sample, placed in separate sample containers, assigned unique identification numbers and sent as blind samples to the same laboratory as the original samples to be analyzed independently, providing an intra-laboratory comparison of results. Duplicate samples are required for ASLs C and D and may be appropriate for other ASLs as determined by DQOs.

Split sample analyses are used to evaluate precision of analytical laboratory performance as well as some aspects of field sample handling practices. Split samples are prepared by field sampling teams at sampling locations by subsampling a homogenous sample into two or more portions or sets of sample containers and submitting each portion (split sample) as a separate sample to the laboratory for analysis. Split samples provide results for interlaboratory or intralaboratory comparison. When a non-fluid matrix split sample is collected, the homogenization and subsampling procedures shall be presented in the work plan. Split samples may be required for ASLs B, C, and D.

Field spike control samples are used to determine precision and accuracy of analytical laboratory performance. They are prepared in a laboratory environment and transported to the sampling site for numbering and shipment to the laboratory with the remaining field samples. If required, field spike control samples are included once every sixty days or at least once per project, more frequently if appropriate, or when accuracy of a particular laboratory is in question. When necessary, the collection of a field spike control sample shall be stipulated in the PSP, and the quantitative requirements for accuracy by the chosen analytical method shall be justified. Field spike control samples may be specified for ASLs B through E.

Material blanks are samples of material used in construction, decontamination, or other activity (e.g., drilling fluids, annular sealants, cleaning solutions) that are retained for quality control purposes when unexpected contaminants are detected in related media. A material blank shall be collected in a controlled environment from each solution or mixture of materials (e.g., cleaning solutions and drilling fluids) that have the potential to introduce contamination not otherwise present in the media being sampled. These samples shall be clearly marked as retained samples and placed in an archive for future analysis if an anomalous contamination is identified upon review of sample analysis. Material blanks may be analyzed at any ASL.

Controlled-Document Coordinator. The controlled document coordinator is a Fluor Fernald representative responsible for issuing, tracking, and distributing revisions to controlled documents at the FEMP.

Data Package. See Sample Delivery Group.

Data Qualifiers. Data qualifiers are specifically defined letters, groups of letters, and symbols used by data validators to qualify the useability of data.

Data Quality Organization. The FEMP data quality organization is the group that is responsible for the management of activities necessary to verify and assure compliance of data generation functions with the appropriate site and regulatory requirements.

Dedicated Equipment. Dedicated equipment are systems exclusive to a location or purpose.

Designated FEMP Quality Assurance Organization. The Quality Assurance group of Fluor Fernald is designated by DOE to be responsible for oversight of QA functions of contractors and subcontractors onsite. The designated FEMP Quality Assurance Organization may utilize Quality Assurance resources of other contractor and subcontractor organizations to fulfill its duties.

Designee. A designee is an individual designated to perform a function in place of the defined responsible individual. The delegation of authority to a designee must be documented in the project record and must include the scope and length of time the delegation is in effect.

Deviation. A deviation is any departure from a specified requirement; it is used interchangeably with nonconformance. It can be a condition in which a characteristic of an item does not conform to prescribed limits, a required document is not available or is inadequate, a regulatory requirement was violated, or a procedure does not yield desired results.

DQO Coordinator. The DQO coordinator is responsible for overall control of the DQO process at the FEMP. This includes assigning DQO numbers, ensuring that all required approvals have been received, distributing the approved controlled documents, and storing the DQO files.

Duplicate. A duplicate may be a second analysis (or count) of the same sample (duplicate analysis) or identical analyses of two samples that were obtained from a single sample (duplicate sample).

Electro-Fishing. This refers to a fresh-water fish sampling method that uses a pulsating direct current electro-shocker between 300 and 30,000 ohms to stun fish for collection.

Environmental Safety and Health Organization (ES&H). ES&H is the Fluor Fernald group responsible for the radiological and industrial safety of FEMP workers. ES&H may utilize expertise and resources of other contractor and subcontractor organizations to fulfill its duties.

If additional types or frequencies of these QC samples are required, they will be specified in the PSP.

- G. Performance evaluation samples supplied by National Performance Evaluation Programs are used to review the comparability of analytical results for all laboratories performing analysis for the FEMP. Results are evaluated against the expected value and against results from other participating laboratories. Each laboratory shall participate in at least one study for the analytes that it analyzes for the FEMP.

4.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

The fundamental QA objective, with respect to accuracy, precision, and sensitivity of laboratory analyses, is to meet QC acceptance criteria of analytical protocols. The accuracy, precision, and sensitivity objectives for each major measurement parameter at the FEMP are pertinent to laboratory methods. Specific information on accuracy, precision, and sensitivity is presented in Section 14.

Standard operating procedures shall be written for laboratory analyses and field analyses, and shall include required accuracy, precision, and sensitivity specifications for the analyses. PSPs shall include project required precision, accuracy, representativeness, completeness and comparability guidelines.

4.2.1 Analytical Precision

A routine program of duplicate or replicate analysis must be established to assess the precision of an analytical method, instrument, or laboratory analysis. Results of these analyses are used to calculate relative percent difference for duplicates, matrix spike duplicates, or replicates (see Section 14 for further explanation, including the equation for evaluating relative percent difference). Relative percent difference values may be used to generate precision control charts for organic and inorganic laboratories. The Relative Error Ratio (RER) is used to assess the precision of duplicate measurements for radiochemical analyses. See Appendix G, Table G-4 for a definition of RER.

Range analysis may be used to evaluate the precision or reproducibility of radiological data derived from methods for which performance data are not currently available. Statistical range analysis is used to calculate the expected mean range and control limits for a replicate or duplicate result and assess whether the result is "in control." A range analysis result that lies within three standard deviations of the mean is considered in control. Range analysis results greater than three standard deviations from the mean are considered to be "out of control." Results that are out of control may be re-analyzed as required by the method, or results may be flagged or qualified for use during data validation (refer to Appendix D).

4.2.2 Laboratory Accuracy

Analytical results of laboratory control samples, method blanks, matrix spikes/matrix spike duplicates, field blanks, and container blanks must be assessed along with a periodic program of sample spiking to assess the accuracy of a chemical method or a chemical laboratory analysis. The results of sample spiking are used to calculate percent recovery, which is the quality control indicator for accuracy. Percent recovery of matrix spikes is used to generate accuracy control charts.

Certification Unit 1

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-1-1-1	1.387 -	1.098 -	1.09 -	1.098 -	11.695 -	0.37 -	0.103 J	0.276 U	9.77 J	0.068 J	43.2 UJ
A9P1-C-1-2-1	--	--	--	--	--	--	--	--	3.81 -	--	--
A9P1-C-1-3-1	1.472 -	1.236 -	1.24 -	1.236 -	15.008 -	0.548 -	0.075 J	0.336 J	7.96 J	0.2 J	43.3 UJ
A9P1-C-1-4-1	1.259 -	1.091 -	1.107 -	1.091 -	10.987 -	0.348 -	0.06 J	0.274 U	6 J	0.033 UJ	41.9 UJ
A9P1-C-1-5-1	--	--	--	--	--	--	--	--	5.18 -	--	--
A9P1-C-1-6-1	1.529 -	1.1 -	1.077 -	1.1 -	16.144 -	0.459 -	0.082 J	0.281 U	11.6 J	0.52 J	42.2 UJ
A9P1-C-1-7-1	1.341 -	1.124 -	1.094 -	1.124 -	9.257 -	0.558 -	0.065 J	0.301 UJ	9.74 J	0.3 J	44.2 UJ
A9P1-C-1-8-1	1.405 -	1.191 -	1.142 -	1.191 -	12.431 -	0.223 -	0.048 J	0.296 U	8.43 -	0.12 J	43.2 UJ
A9P1-C-1-9-1	1.327 -	1.036 -	0.955 -	1.036 -	15.418 -	0.326 -	0.086 J	0.272 J	5.43 -	0.034 UJ	42.5 UJ
A9P1-C-1-10-1	1.136 -	1.082 -	1.053 -	1.082 -	12.031 -	0.291 -	0.077 J	0.25 U	6.05 -	0.031 UJ	45.8 UJ
A9P1-C-1-11-1	--	--	--	--	--	--	--	--	5.7 -	--	--
A9P1-C-1-12-1	1.209 -	0.946 -	0.901 -	0.946 -	5.105 -	0.184 -	0.039 J	0.286 U	10.2 -	0.23 J	42.5 UJ
A9P1-C-1-13-1	1.207 -	1.101 -	1.101 -	1.101 -	16.401 -	0.469 -	0.049 J	0.256 U	5.46 -	0.035 UJ	45.9 UJ
A9P1-C-1-13-1-D	1.259 -	1.067 -	1.053 -	1.067 -	12.06 -	0.448 -	0.096 J	0.342 J	6.86 -	0.034 UJ	47.4 UJ
A9P1-C-1-14-1	1.331 -	1.082 -	1.072 -	1.082 -	10.656 -	0.229 -	0.059 J	0.259 U	9.95 -	0.17 J	42.8 UJ
A9P1-C-1-15-1	1.266 -	1.047 -	1.014 -	1.047 -	8.101 -	0.138 -	0.056 J	0.294 U	7.52 -	0.16 J	43.7 UJ
A9P1-C-1-16-1	--	--	--	--	--	--	--	--	6.86 -	--	--
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.529	1.236 @	1.24 @	1.236 @	16.401 @	0.558 @	0.103 @	0.342 @	11.6	0.52 @	23.7 @
Standardized Skewness	0.3	--	--	--	--	--	--	--	0.33	--	--
W-Statistic Probability *	0.982	--	--	--	--	--	--	--	0.715	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	16	12	12
Number of NDs	0	0	0	0	0	0	0	9	0	4	12
Estimated Mean**	1.33	--	--	--	--	--	--	--	7.60	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	8.49	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	7	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Pass	--	--

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Certification Unit 2

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-2-2-1	1.331 J	1.085 -	1.099 -	1.085 -	7.091 J	0.221 U	2.95 J	0.034 U	44.6 UJ
A9P1-C-2-3-1	1.293 J	1.073 -	1.051 -	1.073 -	14.116 J	0.253 U	3.52 J	0.033 U	43.2 UJ
A9P1-C-2-4-1	1.41 J	1.079 -	1.062 -	1.079 -	11.741 J	0.249 U	4.83 J	0.035 U	42.9 UJ
A9P1-C-2-5-1	1.042 J	0.778 -	0.746 -	0.778 -	3.279 U	0.258 J	5.83 J	0.11 -	41.5 UJ
A9P1-C-2-7-1	1.394 J	1.242 -	1.205 -	1.242 -	10.328 J	0.263 U	8.28 J	0.31 -	41.3 UJ
A9P1-C-2-8-1	1.04 J	0.874 -	0.882 -	0.874 -	4.233 J	0.28 U	7.71 J	0.56 -	42.2 UJ
A9P1-C-2-9-1	1.517 J	1.142 -	1.127 -	1.142 -	11.953 J	0.30 U	3.06 J	0.04 J	41.6 UJ
A9P1-C-2-11-1	1.344 J	1.01 -	0.967 -	1.01 -	12.251 J	0.271 U	3.25 J	0.033 U	43.5 UJ
A9P1-C-2-12-1	0.902 J	0.627 -	0.646 -	0.627 -	5.134 J	0.256 U	6.01 J	0.075 -	36.9 UJ
A9P1-C-2-13-1	1.013 J	0.656 -	0.645 -	0.656 -	4.587 J	0.304 U	7.47 J	0.18 J	38.3 UJ
A9P1-C-2-13-1-D	1.153 J	0.702 -	0.703 -	0.702 -	3.288 U	0.304 U	8.2 J	0.27 J	40.1 UJ
A9P1-C-2-14-1	1.233 J	0.787 -	0.776 -	0.787 -	4.37 J	0.318 UJ	5.45 J	0.38 -	40.3 UJ
A9P1-C-2-15-1	1.37 J	1.044 -	1.051 -	1.044 -	6.372 J	0.256 U	8.03 J	0.509 -	41.3 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.517	1.242 @	1.205 @	1.242 @	14.116 @	0.258 @	8.28 @	0.56 @	22.3 @
Standardized Skewness	-0.88	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.482	--	--	--	--	--	--	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	11	0	4	12
Estimated Mean**	1.25	--	--	--	--	--	--	--	--
UCL of the Mean	1.35	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

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Certification Unit 3

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-3-1-1	1.365 -	1.154 -	1.153 -	1.154 -	27.485 -	0.366 -	8.29 -	0.034 U	45.5 UJ
A9P1-C-3-3-1	1.369 -	1.108 -	1.057 -	1.108 -	16.7 -	0.247 U	3.26 -	0.032 U	41.4 UJ
A9P1-C-3-4-1	1.694 -	1.245 -	1.258 -	1.245 -	6.458 -	0.266 U	10.1 -	0.13 -	43.2 UJ
A9P1-C-3-5-1	1.112 -	0.878 -	0.856 -	0.878 -	6.548 -	0.385 -	7.25 -	0.25 -	40.2 UJ
A9P1-C-3-6-1	1.074 -	0.828 -	0.838 -	0.828 -	7.334 -	0.245 U	4.2 -	0.16 -	42.1 UJ
A9P1-C-3-7-1	1.214 -	1.025 -	1.015 -	1.025 -	14.432 -	0.32 J	3.8 -	0.03 U	42.4 UJ
A9P1-C-3-9-1	1.50 -	1.214 -	1.181 -	1.214 -	13.623 -	0.259 U	8.66 -	0.083 -	41.7 UJ
A9P1-C-3-10-1	1.089 -	0.959 -	0.947 -	0.959 -	10.108 -	0.262 U	3.9 -	0.03 U	39.9 UJ
A9P1-C-3-11-1	1.456 -	1.139 -	1.116 -	1.139 -	12.288 -	0.317 UJ	5.96 -	0.42 -	42.2 UJ
A9P1-C-3-13-1	1.232 -	1.03 -	0.974 -	1.03 -	16.167 -	0.313 UJ	3.16 -	0.035 U	43.4 UJ
A9P1-C-3-14-1	1.273 -	1.04 -	1.038 -	1.04 -	15.585 -	0.248 U	3.33 -	0.031 U	42.7 UJ
A9P1-C-3-16-1	1.415 -	1.086 -	1.055 -	1.086 -	11.97 -	0.221 U	8.72 -	0.032 U	42.3 UJ
A9P1-C-3-16-1-D	1.292 -	1.07 -	1.074 -	1.07 -	8.561 -	0.229 U	6.51 -	0.033 U	42.7 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.694	1.245 @	1.258 @	1.245 @	27.485 @	0.385 @	10.1	0.42 @	22.8 @
Standardized Skewness	0.67	--	--	--	--	--	0.53	--	--
W-Statistic Probability *	0.762	--	--	--	--	--	0.063	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	9	0	7	12
Estimated Mean**	1.32	--	--	--	--	--	5.94	--	--
UCL of the Mean	1.42	--	--	--	--	--	7.30	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	Pass	--	--
a posteriori Sample	8	--	--	--	--	--	4	--	--
Size Calculation	Pass	--	--	--	--	--	Pass	--	--

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Certification Unit 4

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-4-1-1	1.26 -	1.013 -	0.991 -	1.013 -	11.213 -	0.291 U	4.8 J	0.036 U	47.5 UJ
A9P1-C-4-2-1	1.364 -	1.087 -	1.097 -	1.087 -	11.71 -	0.349 J	4.42 J	0.032 U	42.9 UJ
A9P1-C-4-4-1	1.397 -	1.126 -	1.122 -	1.126 -	14.029 -	0.251 U	4.81 J	0.034 U	44.3 UJ
A9P1-C-4-6-1	1.162 -	1.067 -	1.043 -	1.067 -	11.671 -	0.247 U	3.34 J	0.034 U	43.3 UJ
A9P1-C-4-6-1-D	1.173 -	1.127 -	1.108 -	1.127 -	12.742 -	0.287 U	3.48 J	0.031 U	44.4 UJ
A9P1-C-4-7-1	1.274 -	1.079 -	1.053 -	1.079 -	12.967 -	0.322 J	4.08 J	0.032 U	43.6 UJ
A9P1-C-4-8-1	1.614 -	1.34 -	1.317 -	1.34 -	17.465 -	0.307 J	6.24 J	0.43 -	44 UJ
A9P1-C-4-10-1	1.344 -	1.01 -	1.001 -	1.01 -	16.165 -	0.252 J	4.41 J	0.035 U	43.2 UJ
A9P1-C-4-11-1	1.548 -	1.197 -	1.19 -	1.197 -	27.351 -	0.499 -	5.26 J	0.27 -	46 UJ
A9P1-C-4-12-1	1.397 -	0.997 -	0.951 -	0.997 -	12.072 -	0.377 -	6.41 J	0.095 -	47.8 UJ
A9P1-C-4-14-1	1.249 -	1.043 -	1.062 -	1.043 -	25.273 -	0.35 J	3.77 J	0.032 U	45 UJ
A9P1-C-4-15-1	1.32 -	1.126 -	1.121 -	1.126 -	31.619 -	0.299 J	4.72 J	0.035 U	44.8 UJ
A9P1-C-4-16-1	1.603 -	1.346 -	1.301 -	1.346 -	17.426 -	0.412 -	4.84 J	0.22 -	46.1 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.614	1.346 @	1.317 @	1.346 @	31.619 @	0.499 @	6.410 @	0.430 @	23.900 @
Standardized Skewness	0.81	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.4	--	--	--	--	--	--	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	3	0	8	12
Estimated Mean**	1.38	--	--	--	--	--	--	--	--
UCL of the Mean	1.46	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	10	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

000024

4494

Certification Unit 5

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-5-2-2	1.528 -	1.239 -	1.223 -	1.239 -	7.598 -	0.253 U	7.27 -	0.31 -	42.3 UJ
A9P1-C-5-3-2	1.381 -	1.103 -	1.088 -	1.103 -	7.436 -	0.253 U	6.84 -	0.06 J	41 UJ
A9P1-C-5-4-2	1.366 -	1.111 -	1.097 -	1.111 -	9.122 -	0.246 U	4.21 J	0.14 -	42.3 UJ
A9P1-C-5-4-2-D	1.363 -	1.103 -	1.082 -	1.103 -	8.959 -	0.234 U	4.74 J	0.3 -	41.9 UJ
A9P1-C-5-5-2	1.322 -	1.099 -	1.069 -	1.099 -	8.267 -	0.278 U	3.3 -	0.22 -	40 UJ
A9P1-C-5-6-2	1.376 -	1.094 -	1.109 -	1.094 -	9.159 -	0.258 U	8.37 -	0.14 -	41.6 UJ
A9P1-C-5-7-2	1.219 -	1.013 -	1.009 -	1.013 -	4.681 J	0.238 U	3.89 -	0.024 U	41.3 UJ
A9P1-C-5-9-2	1.193 -	1.021 -	0.991 -	1.021 -	6.049 -	0.235 U	4.61 -	0.06 J	42 UJ
A9P1-C-5-10-2	1.164 -	1.129 -	1.128 -	1.129 -	8.736 -	0.289 U	4.73 -	0.05 J	41.9 UJ
A9P1-C-5-12-2	1.371 -	1.158 -	1.113 -	1.158 -	9.752 -	0.263 U	6.19 -	0.18 -	41 UJ
A9P1-C-5-13-2	1.398 -	1.131 -	1.136 -	1.131 -	9.644 -	0.281 J	6.03 -	0.23 -	41.6 UJ
A9P1-C-5-14-2	1.392 -	1.108 -	1.074 -	1.108 -	12.179 -	0.393 -	5.66 -	0.32 -	41.5 UJ
A9P1-C-5-16-2	1.325 -	1.117 -	1.136 -	1.117 -	5.402 -	0.307 J	6.75 -	0.46 -	40.3 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.528	1.239 @	1.223 @	1.239 @	12.179 @	0.393 @	8.370 @	0.460 @	21.150 @
Standardized Skewness	-0.29	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.215	--	--	--	--	--	--	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	9	0	1	12
Estimated Mean**	1.34	--	--	--	--	--	--	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	4	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

000025

A.1 CU5

4494

Certification Unit 6

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-6-1-2	1.367 -	1.146 -	1.118 -	1.146 -	8.787 -	0.25 U	6.16 J	0.13 J	42.4 UJ
A9P1-C-6-2-2	1.394 -	1.122 -	1.095 -	1.122 -	6.102 -	0.268 U	6.75 J	0.41 J	40.5 UJ
A9P1-C-6-3-2	1.537 -	1.216 -	1.169 -	1.216 -	9.461 -	0.263 U	5.93 J	0.26 -	40.9 UJ
A9P1-C-6-5-2	1.361 -	1.174 -	1.146 -	1.174 -	11.816 -	0.26 U	5.45 J	0.06 J	41.7 UJ
A9P1-C-6-7-2	1.442 -	1.143 -	1.141 -	1.143 -	7.049 -	0.272 U	8.19 J	0.19 -	41.8 UJ
A9P1-C-6-8-2	1.367 -	1.173 -	1.132 -	1.173 -	12.214 -	0.277 U	6.86 J	0.26 -	40.9 UJ
A9P1-C-6-9-2	1.456 -	1.182 -	1.128 -	1.182 -	6.894 -	0.261 U	6.84 J	0.28 -	40 UJ
A9P1-C-6-9-2-D	1.328 -	1.11 -	1.087 -	1.11 -	9.059 -	0.279 U	7.07 J	0.16 -	40.5 UJ
A9P1-C-6-10-2	1.321 -	1.112 -	1.084 -	1.112 -	10.551 -	0.28 U	10.1 J	0.34 -	39.8 UJ
A9P1-C-6-11-2	1.545 -	1.188 -	1.163 -	1.188 -	8.323 -	0.267 U	10.9 J	0.44 -	41 UJ
A9P1-C-6-13-2	1.651 -	1.26 -	1.208 -	1.26 -	6.14 -	0.276 U	11.9 J	0.45 -	40.2 UJ
A9P1-C-6-15-2	1.598 -	1.298 -	1.239 -	1.298 -	9.371 -	0.285 U	10.5 J	0.73 -	40.5 UJ
A9P1-C-6-16-2	1.491 -	1.276 -	1.237 -	1.276 -	8.759 -	0.272 U	10.2 J	0.36 -	40.4 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.651	1.298 @	1.239 @	1.298 @	12.214 @	0.142 @	11.9	0.73	21.2 @
Standardized Skewness	0.65	--	--	--	--	--	0.37	1.16	--
W-Statistic Probability *	0.582	--	--	--	--	--	0.194	0.588	--
Test Procedure	t-Test (LN)	--	--	--	--	--	t-Test (LN)	t-Test (N)	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	0	0	12
Estimated Mean**	1.46	--	--	--	--	--	8.36	0.326	--
UCL of the Mean	1.52	--	--	--	--	--	9.39	0.395	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	Pass	Pass	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	Pass	Pass	--
a posteriori Sample	39	--	--	--	--	--	12	3	--
Size Calculation	Fail	--	--	--	--	--	Pass	Pass	--

000026

4494

Certification Unit 7

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-7-1-2	1.451 -	1.091 -	1.039 -	1.091 -	12.95 -	0.267 U	5.59 -	0.32 J	39.3 UJ
A9P1-C-7-2-2	1.307 -	1.165 -	1.121 -	1.165 -	7.503 -	0.301 J	5.47 -	0.06 J	38.7 UJ
A9P1-C-7-4-2	1.289 -	1.089 -	1.086 -	1.089 -	12.132 -	0.235 U	4.92 -	0.023 UJ	39.9 UJ
A9P1-C-7-6-2	1.425 -	1.16 -	1.115 -	1.16 -	14.136 -	0.25 U	5.12 -	0.05 J	44.3 UJ
A9P1-C-7-7-2	1.314 -	1.117 -	1.098 -	1.117 -	11.229 -	0.311 J	6.38 -	0.023 UJ	41.1 UJ
A9P1-C-7-8-2	1.328 -	1.127 -	1.1 -	1.127 -	5.168 J	0.251 U	5.86 -	0.03 J	38.6 UJ
A9P1-C-7-9-2	1.615 -	1.221 -	1.192 -	1.221 -	15.322 -	0.256 U	6.52 -	0.19 J	41.6 UJ
A9P1-C-7-10-2	1.521 -	1.111 -	1.08 -	1.111 -	15.504 -	0.269 U	6.3 -	0.34 J	40.3 UJ
A9P1-C-7-12-2	1.424 -	1.119 -	1.092 -	1.119 -	10.973 -	0.249 U	5.13 -	0.023 UJ	41.2 UJ
A9P1-C-7-13-2	1.418 -	1.153 -	1.125 -	1.153 -	12.529 -	0.245 U	6.45 -	0.025 UJ	41.8 UJ
A9P1-C-7-13-2-D	1.363 -	1.237 -	1.209 -	1.237 -	15.836 -	0.243 U	5.88 -	0.08 J	41.6 UJ
A9P1-C-7-15-2	1.325 -	1.188 -	1.158 -	1.188 -	15.764 -	0.323 J	5.61 -	0.023 UJ	40.9 UJ
A9P1-C-7-16-2	1.219 -	1.019 -	1.009 -	1.019 -	11.05 -	0.302 J	4.78 -	0.023 UJ	42.5 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.615	1.237 @	1.209 @	1.237 @	15.836 @	0.323 @	6.52 @	0.34 @	22.2 @
Standardized Skewness	0.9	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.712	--	--	--	--	--	--	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	8	0	5	12
Estimated Mean**	1.39	--	--	--	--	--	--	--	--
UCL of the Mean	1.45	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--
a posteriori Sample	8	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--

000027

A.1 CU7

4494

Certification Unit 8

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Aroclor-1260	Arsenic	Beryllium
A9P1-C-8-1-2	1.392 -	1.121 -	1.113 -	1.121 -	10.239 -	0.248 U	41.7 UJ	6.47 J	0.23 J
A9P1-C-8-3-2	1.487 -	1.099 -	1.087 -	1.099 -	14.307 -	0.254 U	41.3 UJ	4.37 -	0.03 UJ
A9P1-C-8-4-2	1.361 -	1.2 -	1.178 -	1.2 -	9.516 -	0.296 U	42.9 UJ	8.16 -	0.68 J
A9P1-C-8-4-2-D	1.428 -	1.206 -	1.213 -	1.206 -	11.05 -	0.327 UJ	42.6 UJ	8.47 J	0.67 J
A9P1-C-8-6-2	1.362 -	1.214 -	1.222 -	1.214 -	14.371 -	0.29 U	42.9 UJ	6.13 -	0.03 UJ
A9P1-C-8-7-2	1.387 -	1.099 -	1.04 -	1.099 -	10.016 -	0.261 U	41.4 UJ	9.94 -	0.03 UJ
A9P1-C-8-8-2	1.584 -	1.066 -	1.036 -	1.066 -	10.444 -	0.249 U	43 UJ	0.88 U	0.29 J
A9P1-C-8-9-2	1.551 -	1.254 -	1.259 -	1.254 -	20.404 -	0.287 U	41 UJ	8.29 -	0.13 J
A9P1-C-8-10-2	1.467 -	1.18 -	1.208 -	1.18 -	11.421 -	0.266 U	41.9 UJ	6.65 -	0.09 J
A9P1-C-8-12-2	1.727 -	1.319 -	1.304 -	1.319 -	11.298 -	0.278 U	42.8 UJ	10.5 -	0.56 J
A9P1-C-8-13-2	1.634 -	1.279 -	1.238 -	1.279 -	15.541 -	0.268 U	41 UJ	5.98 -	0.03 UJ
A9P1-C-8-15-2	1.352 -	1.158 -	1.122 -	1.158 -	14.901 -	0.235 U	41.4 UJ	5.0 -	0.05 J
A9P1-C-8-16-2	1.574 -	1.312 -	1.289 -	1.312 -	18.026 -	0.282 U	43.1 UJ	8.53 -	0.53 J
FRL	1.5	1.4	1.5	1.4	50	1	40	9.6	0.62
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	ug/kg	mg/kg	mg/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.727	1.319 @	1.304 @	1.319 @	20.404 @	0.164 @	21.6 @	10.5	0.68
Standardized Skewness	0.77	--	--	--	--	--	--	-1.25	1.37
W-Statistic Probability *	0.507	--	--	--	--	--	--	0.435	0.056
Test Procedure	t-Test (LN)	--	--	--	--	--	--	t-Test (N)	Wilcoxon SR
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	12	1	4
Estimated Mean**	1.50	--	--	--	--	--	--	6.73	0.11
UCL of the Mean	1.56	--	--	--	--	--	--	7.81	0.29
Non-Parametric Prob.	--	--	--	--	--	--	--	--	0.001
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	Pass	Pass
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	Pass	Pass
a posteriori Sample	69	--	--	--	--	--	--	5	3
Size Calculation	Fail	--	--	--	--	--	--	Pass	Pass

820000

4494

Certification Unit 9

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-9-1-2	1.249 J	1.125 -	1.097 -	1.125 -	11.813 -	0.277 U	5.26 J	0.023 U	42.3 UJ
A9P1-C-9-2-2	1.411 J	1.129 -	1.117 -	1.129 -	11.504 -	0.272 U	6.1 J	0.023 U	42.1 UJ
A9P1-C-9-3-2	1.241 J	1.042 -	1.036 -	1.042 -	10.903 -	0.285 U	5.5 J	0.022 U	41.2 UJ
A9P1-C-9-5-2	1.392 J	1.233 -	1.235 -	1.233 -	14.34 -	0.26 U	6.65 J	0.09 -	41.5 UJ
A9P1-C-9-7-2	1.26 J	1.054 -	1.027 -	1.054 -	15.107 -	0.277 U	3.24 J	0.023 U	42 UJ
A9P1-C-9-8-2	1.318 J	1.071 -	1.073 -	1.071 -	14.15 -	0.267 U	6.31 J	0.022 U	44.6 UJ
A9P1-C-9-10-2	1.293 J	1.136 -	1.075 -	1.136 -	13.86 -	0.268 U	6 J	0.18 -	41.5 UJ
A9P1-C-9-11-2	1.409 J	1.091 -	1.102 -	1.091 -	7.836 -	0.287 U	5.93 J	0.023 U	42.3 UJ
A9P1-C-9-11-2-D	1.238 J	1.061 -	1.032 -	1.061 -	10.979 -	0.277 U	3.72 J	0.024 U	42 UJ
A9P1-C-9-12-2	1.252 J	0.984 -	0.969 -	0.984 -	18.456 -	0.283 U	4.01 J	0.025 U	44.4 UJ
A9P1-C-9-14-2	1.424 J	1.171 -	1.167 -	1.171 -	13.027 -	0.254 U	5.26 J	0.024 U	42.3 UJ
A9P1-C-9-15-2	1.203 J	1.024 -	0.999 -	1.024 -	11.012 -	0.277 U	4.96 J	0.021 U	40.7 UJ
A9P1-C-9-16-2	1.155 J	0.842 -	0.83 -	0.842 -	13.113 -	0.259 U	4.81 J	0.33 -	39.6 UJ
FRL	1.5	1.4	1.5	1.4	50	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max Result	1.424 @	1.233 @	1.235 @	1.233 @	18.456 @	0.143 @	6.65 @	0.33 @	22.3 @
Standardized Skewness	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	12	0	9	12
Estimated Mean**	--	--	--	--	--	--	--	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size Calculation	--	--	--	--	--	--	--	--	--

000029

A.1 CU9

4494

Certification Unit 10

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-10-2-2	1.505 -	1.167 -	1.154 -	1.167 -	11.61 -	0.158 -	0.042 J	0.26 U	8.29 -	0.14 J	42.5 UJ
A9P1-C-10-3-2	1.56 -	1.214 -	1.231 -	1.214 -	17.658 -	0.223 -	0.038 UJ	0.226 U	7.4 -	0.03 UJ	42 UJ
A9P1-C-10-4-2	1.513 -	1.274 -	1.264 -	1.274 -	10.571 -	0.119 -	0.04 UJ	0.23 U	9.72 -	0.34 J	43.2 UJ
A9P1-C-10-5-2	1.379 -	1.134 -	1.126 -	1.134 -	17.867 -	0.247 -	0.043 UJ	0.247 U	6.57 -	0.06 J	43.4 UJ
A9P1-C-10-7-2	1.45 -	1.221 -	1.203 -	1.221 -	17.711 -	0.155 -	0.056 J	0.297 J	8.71 -	0.05 J	41.5 UJ
A9P1-C-10-8-2	1.522 -	1.215 -	1.214 -	1.215 -	10.316 -	0.16 -	0.052 UJ	0.236 U	8.83 -	0.03 UJ	41.7 UJ
A9P1-C-10-9-2	1.569 -	1.238 -	1.192 -	1.238 -	17.024 -	0.213 -	0.042 J	0.227 U	8.65 -	0.07 J	42.1 UJ
A9P1-C-10-10-2	1.632 -	1.248 -	1.22 -	1.248 -	10.242 -	0.139 -	0.05 J	0.374 -	8.51 -	0.19 J	41.8 UJ
A9P1-C-10-12-2	1.536 -	1.215 -	1.179 -	1.215 -	18.235 -	0.18 -	0.045 UJ	0.247 U	7.68 -	0.15 J	42 UJ
A9P1-C-10-12-2-D	1.481 -	1.22 -	1.188 -	1.22 -	14.68 -	0.159 -	0.051 UJ	0.253 J	8.85 -	0.11 J	41.3 UJ
A9P1-C-10-14-2	1.349 -	1.234 -	1.201 -	1.234 -	23.157 -	0.232 -	0.068 J	0.331 J	6.66 -	0.06 J	40.3 UJ
A9P1-C-10-15-2	1.467 -	1.195 -	1.151 -	1.195 -	13.348 -	0.151 -	0.057 UJ	0.255 J	8.66 -	0.15 J	41.3 UJ
A9P1-C-10-16-2	1.386 -	1.149 -	1.102 -	1.149 -	10.172 -	0.131 -	0.026 UJ	0.253 U	7.65 -	0.1 J	39.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.632	1.274 @	1.264 @	1.274 @	23.157 @	0.247 @	0.068 @	0.374 @	9.72	0.34 @	21.7 @
Standardized Skewness	-0.32	--	--	--	--	--	--	--	-0.82	--	--
W-Statistic Probability *	0.767	--	--	--	--	--	--	--	0.181	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	t-Test (N)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	7	7	0	2	12
Estimated Mean**	1.49	--	--	--	--	--	--	--	8.21	--	--
UCL of the Mean	1.53	--	--	--	--	--	--	--	8.58	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	119	--	--	--	--	--	--	--	3	--	--
Size Calculation	Fail	--	--	--	--	--	--	--	Pass	--	--

000030

4494

Certification Unit 11

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-11-1-2	1.481 -	1.25 J	1.246 J	1.25 J	22.359 -	0.266 -	0.061 UJ	0.346 J	7.17 -	0.21 J	42.7 UJ
A9P1-C-11-2-2	1.408 -	1.229 J	1.215 J	1.229 J	12.049 -	0.111 -	0.044 UJ	0.259 U	4.06 J	0.03 UJ	41.3 UJ
A9P1-C-11-3-2	1.413 -	1.273 J	1.275 J	1.273 J	12.681 -	0.169 -	0.045 UJ	0.275 U	4.36 J	0.03 UJ	41.6 UJ
A9P1-C-11-5-2	1.461 -	1.277 J	1.247 J	1.277 J	23.979 -	0.26 -	0.059 J	0.278 U	6.59 -	0.09 J	42.2 UJ
A9P1-C-11-7-2	1.394 -	1.292 J	1.263 J	1.292 J	10.925 -	0.181 -	0.054 UJ	0.282 U	4.14 J	0.03 UJ	41.8 UJ
A9P1-C-11-8-2	1.541 -	1.344 J	1.323 J	1.344 J	8.974 -	0.107 -	0.06 UJ	0.356 J	6.2 J	0.17 J	41.6 UJ
A9P1-C-11-10-2	1.432 -	1.247 J	1.235 J	1.247 J	16.025 -	0.153 -	0.045 UJ	0.387 J	5.66 J	0.03 UJ	41.1 UJ
A9P1-C-11-11-2	1.638 -	1.289 J	1.236 J	1.289 J	8.971 -	0.06 U	0.045 UJ	0.329 J	7.14 -	0.21 J	42.3 UJ
A9P1-C-11-12-2	1.489 -	1.272 J	1.257 J	1.272 J	9.556 -	0.074 U	0.034 UJ	0.274 U	11.1 -	0.06 J	42 UJ
A9P1-C-11-13-2	1.318 -	1.126 J	1.124 J	1.126 J	19.016 -	0.211 -	0.059 UJ	0.266 J	7.49 -	0.06 J	41.5 UJ
A9P1-C-11-15-2	1.465 -	1.345 J	1.308 J	1.345 J	10.849 -	0.163 -	0.061 UJ	0.311 UJ	6.98 -	0.14 J	42.3 UJ
A9P1-C-11-16-2	1.509 -	1.177 J	1.111 J	1.177 J	14.474 -	0.147 -	0.048 UJ	0.324 UJ	3.86 J	0.04 J	42.5 UJ
A9P1-C-11-16-2-D	1.53 -	1.359 J	1.314 J	1.359 J	12.233 -	0.146 -	0.064 J	0.304 UJ	5.72 J	0.1 J	40.6 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.638	1.359 @	1.323 @	1.359 @	23.979 @	0.266 @	0.064 @	0.387 @	11.1	0.21 @	21.4 @
Standardized Skewness	0.61	--	--	--	--	--	--	--	1.62	--	--
W-Statistic Probability *	0.958	--	--	--	--	--	--	--	0.342	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	10	7	0	4	12
Estimated Mean**	1.46	--	--	--	--	--	--	--	6.40	--	--
UCL of the Mean	1.51	--	--	--	--	--	--	--	7.25	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	31	--	--	--	--	--	--	--	3	--	--
Size Calculation	Fail	--	--	--	--	--	--	--	Pass	--	--

0000031

4494

Certification Unit 12

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-12-1-2	1.408 J	1.173 -	1.152 -	1.173 -	7.698 -	0.095 J	0.035 UJ	0.274 U	14.1 J	0.034 U	41.7 UJ
A9P1-C-12-2-2	1.453 J	1.147 -	1.107 -	1.147 -	8.403 -	0.15 -	0.031 UJ	0.267 U	5.95 J	0.032 U	41.7 UJ
A9P1-C-12-4-2	1.428 J	1.286 -	1.237 -	1.286 -	8.301 -	0.099 -	0.034 UJ	0.25 U	7.2 J	0.03 U	41.8 UJ
A9P1-C-12-6-2	1.311 J	1.204 -	1.173 -	1.204 -	10.653 -	0.117 -	0.03 UJ	0.284 U	10.7 J	0.031 U	41.5 UJ
A9P1-C-12-6-2-D	1.101 J	1.087 -	1.067 -	1.087 -	8.241 -	0.097 -	0.034 UJ	0.28 U	9.95 J	0.031 U	6.7 J
A9P1-C-12-7-2	1.316 J	1.128 -	1.106 -	1.128 -	12.425 -	0.183 -	0.03 UJ	0.276 U	11.7 J	0.069 -	41.2 UJ
A9P1-C-12-8-2	1.328 J	1.192 -	1.173 -	1.192 -	19.442 -	0.184 -	0.054 J	0.352 J	13.9 J	0.23 -	41.6 UJ
A9P1-C-12-9-2	1.201 J	1.092 -	1.101 -	1.092 -	15.129 -	0.141 -	0.037 UJ	0.261 U	9.29 J	0.14 -	41.2 UJ
A9P1-C-12-10-2	1.337 J	1.186 -	1.167 -	1.186 -	15.651 -	0.163 -	0.044 J	0.51 -	11 J	0.24 -	41.5 UJ
A9P1-C-12-12-2	1.55 J	1.27 -	1.23 -	1.27 -	16.175 -	0.161 -	0.031 UJ	0.257 J	8.68 J	0.23 -	41.7 UJ
A9P1-C-12-13-2	1.356 J	1.171 -	1.139 -	1.171 -	17.981 -	0.235 -	0.035 J	0.234 U	9.29 J	0.1 -	41.7 UJ
A9P1-C-12-14-2	1.49 J	1.212 -	1.179 -	1.212 -	14.805 -	0.107 -	0.034 J	0.232 U	11.4 J	0.3 -	43.4 UJ
A9P1-C-12-15-2	1.407 J	1.265 -	1.257 -	1.265 -	16.28 -	0.15 -	0.033 UJ	0.252 U	11.5 J	0.2 -	41.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.55	1.286 @	1.257 @	1.286 @	19.442 @	0.235 @	0.054 @	0.51 @	14.1	0.30 @	21.7 @
Standardized Skewness	-0.07	--	--	--	--	--	--	--	-0.31	--	--
W-Statistic Probability *	0.947	--	--	--	--	--	--	--	0.773	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	t-Test (N)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	8	9	0	4	12
Estimated Mean**	1.38	--	--	--	--	--	--	--	10.39	--	--
UCL of the Mean	1.43	--	--	--	--	--	--	--	11.36	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Inconclusive	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	6	--	--	--	--	--	--	--	44	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Fail	--	--

0000032

4494

Certification Unit 13

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-13-2-2	1.374 -	1.234 -	1.214 -	1.234 -	11.186 J	0.097 UJ	0.054 J	0.283 U	9.14 -	0.13 J	41.3 UJ
A9P1-C-13-3-2	1.412 -	1.246 -	1.251 -	1.246 -	9.22 J	0.188 -	0.07 J	0.268 U	8.54 J	0.032 UJ	42 UJ
A9P1-C-13-4-2	1.292 -	1.25 -	1.215 -	1.25 -	15.055 J	0.17 -	0.076 J	0.269 U	7.59 -	0.032 UJ	40.3 UJ
A9P1-C-13-5-2	1.373 -	1.148 -	1.133 -	1.148 -	13.086 J	0.127 -	0.049 UJ	0.24 U	6.4 J	0.038 J	42.2 UJ
A9P1-C-13-7-2	1.331 -	1.172 -	1.129 -	1.172 -	14.427 J	0.148 -	0.041 UJ	0.257 U	5 J	0.03 UJ	41.2 UJ
A9P1-C-13-8-2	1.325 -	1.142 -	1.147 -	1.142 -	7.698 J	0.088 UJ	0.061 J	0.256 U	6.95 J	0.032 UJ	41 UJ
A9P1-C-13-9-2	1.227 -	1.178 -	1.137 -	1.178 -	14.939 J	0.227 -	0.055 UJ	0.329 J	6.2 J	0.034 UJ	42.4 UJ
A9P1-C-13-9-2-D	1.266 -	1.156 -	1.124 -	1.156 -	14.702 J	0.202 -	0.06 J	0.27 U	6.2 J	0.034 UJ	42.4 UJ
A9P1-C-13-10-2	1.373 -	1.157 -	1.134 -	1.157 -	12.228 J	0.143 -	0.053 J	0.265 U	7.22 J	0.031 UJ	41.8 UJ
A9P1-C-13-12-2	1.316 -	1.178 -	1.169 -	1.178 -	13.37 J	0.219 -	0.047 J	0.234 U	6.43 J	0.032 UJ	40.9 UJ
A9P1-C-13-14-2	1.374 -	1.374 -	1.219 -	1.225 -	10.789 J	0.122 -	0.092 J	0.233 U	5.54 -	0.032 UJ	41.5 UJ
A9P1-C-13-15-2	1.435 -	1.23 -	1.225 -	1.23 -	15.014 J	0.213 -	0.049 UJ	0.257 U	6.1 J	0.032 UJ	41.8 UJ
A9P1-C-13-16-2	1.481 -	1.192 -	1.183 -	1.192 -	12.65 J	0.162 -	0.062 J	0.267 U	11 J	0.031 UJ	41.4 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.481 @	1.374 @	1.251 @	1.25 @	15.055 @	0.227 @	0.092 @	0.329 @	11	0.13 @	21.2 @
Standardized Skewness	--	--	--	--	--	--	--	--	1.56	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.851	--	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	3	11	0	10	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.19	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	7.88	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	4	--	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	--	--

000033

A.1 CU13

4494

Certification Unit 14

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-14-1-2	1.539 -	1.241 -	1.24 -	1.241 -	11.877 -	0.156 J	0.025 J	0.138 J	7.47 J	0.033 U	41.8 UJ
A9P1-C-14-2-2	1.626 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-3-2	1.449 -	1.229 -	1.23 -	1.229 -	8.686 -	0.119 J	0.025 UJ	0.125 J	6.54 J	0.12 -	41.5 UJ
A9P1-C-14-4-2	1.442 -	1.309 -	1.31 -	1.309 -	11.357 -	0.12 J	0.033 J	0.196 J	8.93 J	0.06 J	41.6 UJ
A9P1-C-14-5-2	1.534 -	1.209 -	1.166 -	1.209 -	15.196 -	0.121 J	0.022 UJ	0.197 -	7.55 J	0.1 -	41.8 UJ
A9P1-C-14-6-2	1.813 -	1.394 -	1.386 -	1.394 -	12.631 -	0.18 J	0.035 J	0.181 J	9.81 J	0.4 -	41.3 UJ
A9P1-C-14-7-2	1.284 -	0.986 -	0.942 -	0.986 -	11.903 -	0.085 J	0.027 UJ	0.141 J	7.24 J	0.12 -	41.3 UJ
A9P1-C-14-8-2	1.618 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-9-2	1.490 -	1.234 -	1.239 -	1.234 -	12.705 -	0.222 J	0.048 J	0.151 J	8.21 J	0.14 -	42 UJ
A9P1-C-14-10-2	1.394 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-11-2	1.576 -	1.285 -	1.297 -	1.285 -	15.423 -	0.211 J	0.029 J	0.163 -	6.76 J	0.18 -	41.9 UJ
A9P1-C-14-12-2	1.607 -	1.265 -	1.254 -	1.265 -	10.887 -	0.111 J	0.026 J	0.129 U	8.28 J	0.05 J	43.6 UJ
A9P1-C-14-13-2	1.317 -	1.159 -	1.141 -	1.159 -	12.173 -	0.167 J	0.033 J	0.178 -	6.31 J	0.1 -	42.3 UJ
A9P1-C-14-14-2	1.588 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-14-15-2	1.475 -	1.322 -	1.297 -	1.322 -	17.243 -	0.285 J	0.037 J	0.213 -	7.89 J	0.19 -	41.8 UJ
A9P1-C-14-15-2-D	1.476 -	1.305 -	1.26 -	1.305 -	14.837 -	0.188 J	0.051 J	0.139 J	7.26 J	0.12 -	41.7 UJ
A9P1-C-14-16-2	1.626 -	1.305 -	1.269 -	1.305 -	6.98 -	0.129 J	0.038 J	0.149 J	9.78 J	0.07 -	41.8 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	.1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.813	1.394 @	1.386 @	1.394 @	17.243 @	0.285 @	0.051 @	0.213 @	9.81	0.40 @	21.8 @
Standardized Skewness	0.13	--	--	--	--	--	--	--	0.63	--	--
W-Statistic Probability *	0.731	--	--	--	--	--	--	--	0.685	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	16	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	3	1	0	1	12
Estimated Mean**	1.52	--	--	--	--	--	--	--	7.90	--	--
UCL of the Mean	1.58	--	--	--	--	--	--	--	8.39	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Inconclusive	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	193	--	--	--	--	--	--	--	4	--	--
Size Calculation	Fail	--	--	--	--	--	--	--	Pass	--	--

000034

4494

Certification Unit 15

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-15-1-2	1.093 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-2-2	1.4 J	1.143 -	1.105 -	1.143 -	12.163 -	0.117 -	0.035 J	0.128 J	4.16 J	0.03 UJ	41.6 UJ
A9P1-C-15-3-2	1.574 J	1.18 -	1.156 -	1.18 -	12.541 -	0.162 -	0.051 J	0.195 -	7.05 J	0.19 J	41.3 UJ
A9P1-C-15-4-2	1.406 J	1.205 -	1.182 -	1.205 -	10.93 -	0.171 -	0.04 J	0.178 -	4.04 J	0.044 J	42.1 UJ
A9P1-C-15-5-2	1.375 J	0.98 -	0.964 -	0.98 -	7.129 -	0.103 J	0.028 UJ	0.119 U	4.16 J	0.39 J	41 UJ
A9P1-C-15-6-2	1.168 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-7-2	1.304 J	1.097 -	1.09 -	1.097 -	12.635 -	0.148 -	0.032 UJ	0.138 J	4.12 J	0.19 J	41.2 UJ
A9P1-C-15-8-2	1.215 J	1.162 -	1.159 -	1.162 -	7.788 -	0.165 -	0.05 J	0.125 U	3.89 J	0.26 J	40.8 UJ
A9P1-C-15-9-2	1.304 -	--	--	--	--	--	--	--	--	--	--
A9P1-C-15-10-2	1.355 J	1.145 -	1.121 -	1.145 -	14.886 -	0.175 -	0.048 J	0.14 J	3.93 J	0.34 J	41.9 UJ
A9P1-C-15-11-2	1.393 J	1.083 -	1.082 -	1.083 -	7.606 -	0.156 -	0.029 J	0.132 J	2.96 J	0.03 UJ	41.6 UJ
A9P1-C-15-12-2	1.36 J	1.152 -	1.141 -	1.152 -	11.289 -	0.122 -	0.037 J	0.158 U	4.97 J	0.24 J	41.3 UJ
A9P1-C-15-12-2-D	1.169 J	1.133 -	1.093 -	1.133 -	11.558 -	0.091 J	0.024 J	0.121 U	4.58 J	0.26 J	41.3 UJ
A9P1-C-15-13-2	1.422 J	1.149 -	1.122 -	1.149 -	16.488 -	0.203 -	0.038 J	0.141 J	4.66 J	0.031 UJ	41.1 UJ
A9P1-C-15-14-2	1.47 J	1.091 -	1.095 -	1.091 -	8.277 -	0.096 J	0.166 J	0.165 J	4.4 J	0.34 J	41.2 UJ
A9P1-C-15-15-2	1.276 J	1.215 -	1.163 -	1.215 -	12.959 -	0.153 -	0.187 J	0.149 U	5.91 J	0.2 J	40.9 UJ
A9P1-C-15-16-2	1.325 -	--	--	--	--	--	--	--	--	--	--
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.574	1.215 @	1.182 @	1.215 @	16.488 @	0.203 @	0.187 @	0.195 @	7.05 @	0.39 @	21.1 @
Standardized Skewness	-0.49	--	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	0.873	--	--	--	--	--	--	--	--	--	--
Test Procedure	t-Test (N)	--	--	--	--	--	--	--	--	--	--
Sample Size	16	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	2	4	0	3	12
Estimated Mean**	1.34	--	--	--	--	--	--	--	--	--	--
UCL of the Mean	1.39	--	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	--	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	--	--	--

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4494

Certification Unit 16

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-16-2-2	1.378 -	1.211 -	1.215 -	1.211 -	9.679 J	0.22 -	0.045 J	0.301 U	5.87 -	0.031 UJ	42.2 UJ
A9P1-C-16-3-2	1.469 -	1.045 -	1.011 -	1.045 -	11.075 J	0.205 -	0.029 UJ	0.273 UJ	5.86 -	0.047 J	41.3 UJ
A9P1-C-16-4-2	1.453 -	1.275 -	1.263 -	1.275 -	8.817 J	0.132 -	0.03 UJ	0.297 U	11.1 -	0.14 J	41.3 UJ
A9P1-C-16-5-2	1.497 -	1.174 -	1.128 -	1.174 -	12.514 J	0.221 -	0.035 UJ	0.264 U	4.72 -	0.11 J	40.9 UJ
A9P1-C-16-5-2-D	1.422 -	1.237 -	1.219 -	1.237 -	18.066 J	0.235 -	0.044 J	0.289 U	3.8 J	0.1 J	40.5 UJ
A9P1-C-16-7-2	1.494 -	1.245 -	1.221 -	1.245 -	9.05 J	0.184 -	0.035 UJ	0.279 U	0.39 U	0.032 UJ	40.4 UJ
A9P1-C-16-8-2	1.415 -	1.229 -	1.235 -	1.229 -	5.691 J	0.115 -	0.032 UJ	0.289 U	7.79 -	0.068 J	39.7 UJ
A9P1-C-16-10-2	1.351 -	1.201 -	1.203 -	1.201 -	8.669 J	0.127 J	0.04 UJ	0.258 U	6.81 J	0.03 UJ	40.6 UJ
A9P1-C-16-11-2	1.39 -	1.373 -	1.32 -	1.373 -	5.884 J	0.114 -	0.031 UJ	0.286 U	12.7 J	0.74 J	40.2 UJ
A9P1-C-16-12-2	1.463 -	1.2 -	1.176 -	1.2 -	4.471 J	0.128 -	0.033 UJ	0.276 U	8.1 J	0.032 UJ	40.8 UJ
A9P1-C-16-14-2	1.309 -	1.22 -	1.231 -	1.22 -	14.045 J	0.112 J	0.033 UJ	0.28 U	6.21 J	0.03 UJ	40.8 UJ
A9P1-C-16-15-2	1.278 -	1.147 -	1.12 -	1.147 -	12.113 J	0.183 -	0.032 UJ	0.279 U	11 J	0.047 J	41 UJ
A9P1-C-16-16-2	1.42 -	1.265 -	1.235 -	1.265 -	6.918 J	0.072 J	0.037 UJ	0.262 U	7.37 -	0.13 J	41 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.497 @	1.373 @	1.320 @	1.373 @	18.066 @	0.235 @	0.045 @	0.150 @	12.7	0.74	21.1 @
Standardized Skewness	--	--	--	--	--	--	--	--	-0.52	4.45	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.539	0.06	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (N)	Sign Test	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	10	12	1	5	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.31	0.047	--
UCL of the Mean	--	--	--	--	--	--	--	--	8.62	0.11	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	0.003	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
a posteriori Sample	--	--	--	--	--	--	--	--	11	5	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	Pass	--

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Certification Unit 17

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-17-1-2	1.309 -	0.845 -	0.847 -	0.845 -	4.116 J	0.063 U	0.034 UJ	0.274 U	10.3 J	0.95 -	41.5 UJ
A9P1-C-17-2-2	1.359 -	1.172 -	1.146 -	1.172 -	8.796 -	0.138 -	0.05 J	0.267 U	6.81 J	0.59 -	39.8 UJ
A9P1-C-17-2-2-D	1.347 -	1.108 -	1.097 -	1.108 -	12.30 -	0.181 -	0.031 UJ	0.269 U	6.83 J	0.77 -	40.1 UJ
A9P1-C-17-4-2	1.338 -	1.172 -	1.161 -	1.172 -	5.018 J	0.064 U	0.032 UJ	0.286 U	5 J	0.25 -	42.7 UJ
A9P1-C-17-5-2	1.423 -	1.198 -	1.203 -	1.198 -	9.681 -	0.155 -	0.046 J	0.26 U	6.8 J	0.63 -	42.4 UJ
A9P1-C-17-7-2	1.248 -	1.10 -	1.075 -	1.10 -	12.682 -	0.192 -	0.044 J	0.259 U	6 J	0.5 -	40.4 UJ
A9P1-C-17-8-2	1.306 -	1.15 -	1.162 -	1.15 -	11.776 -	0.164 -	0.033 J	0.256 U	5.69 J	0.31 -	42.6 UJ
A9P1-C-17-9-2	1.413 -	1.201 -	1.205 -	1.201 -	12.288 -	0.163 -	0.035 UJ	0.253 U	6.95 J	0.44 -	42.4 UJ
A9P1-C-17-10-2	1.373 -	1.157 -	1.162 -	1.157 -	12.702 -	0.261 -	0.048 J	0.28 U	8.07 J	0.48 -	41.8 UJ
A9P1-C-17-12-2	1.262 -	1.078 -	1.042 -	1.078 -	8.463 -	0.163 -	0.048 J	0.256 U	4.26 J	0.32 -	40.8 UJ
A9P1-C-17-14-2	1.217 -	1.143 -	1.122 -	1.143 -	13.559 -	0.191 -	0.039 UJ	0.285 U	5.3 J	0.32 -	41.9 UJ
A9P1-C-17-15-2	1.261 -	1.074 -	1.019 -	1.074 -	9.515 -	0.189 -	0.036 UJ	0.384 -	4.9 J	0.55 -	40.7 UJ
A9P1-C-17-16-2	1.349 -	1.156 -	1.145 -	1.156 -	12.577 -	0.152 -	0.03 UJ	0.27 J	8.04 J	0.35 -	41 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.423 @	1.201 @	1.205 @	1.201 @	13.559 @	0.261 @	0.050 @	0.384 @	10.3	0.95	21.4 @
Standardized Skewness	--	--	--	--	--	--	--	--	1.26	1.53	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.923	0.765	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (LN)	t-Test (LN)	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	2	6	10	0	0	12
Estimated Mean**	--	--	--	--	--	--	--	--	6.53	0.49	--
UCL of the Mean	--	--	--	--	--	--	--	--	7.26	0.59	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	Pass	--
a posteriori Sample	--	--	--	--	--	--	--	--	3	9	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	Pass	--

Certification Unit 18

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-18-1-2	1.352 -	1.295 J	1.25 -	1.295 J	9.567 -	0.155 -	0.031 J	0.236 U	6.58 -	0.03 U	40.9 UJ
A9P1-C-18-2-2	1.463 -	1.223 J	1.219 -	1.223 J	4.033 U	0.094 -	0.035 J	0.248 U	7.57 J	0.032 U	40.4 UJ
A9P1-C-18-3-2	1.443 -	1.268 J	1.234 -	1.268 J	6.353 -	0.173 -	0.034 UJ	0.239 U	8.93 J	0.031 U	41.3 UJ
A9P1-C-18-5-2	1.291 J	1.152 J	1.113 -	1.152 J	12.971 -	0.103 J	0.035 J	0.251 U	7.84 J	0.031 U	41.6 UJ
A9P1-C-18-7-2	1.34 -	1.171 J	1.119 -	1.171 J	5.922 -	0.147 -	0.038 J	0.244 U	6.08 J	0.032 U	41.4 UJ
A9P1-C-18-8-2	1.366 -	1.20 J	1.169 -	1.20 J	10.399 -	0.205 -	0.028 UJ	0.247 U	4.81 J	0.03 U	41.2 UJ
A9P1-C-18-9-2	1.413 -	1.228 J	1.209 -	1.228 J	12.387 -	0.141 -	0.041 J	0.27 U	7.38 -	0.032 U	40.7 UJ
A9P1-C-18-10-2	1.381 J	1.239 J	1.212 -	1.239 J	9.445 -	0.14 -	0.031 UJ	0.229 U	7.29 J	0.031 U	42.7 UJ
A9P1-C-18-12-2	1.369 -	1.137 J	1.081 -	1.137 J	13.621 -	0.122 -	0.045 J	0.239 U	7.62 J	0.032 U	40.9 UJ
A9P1-C-18-13-2	1.379 -	1.123 J	1.104 -	1.123 J	8.222 -	0.17 -	0.049 J	0.244 U	6.7 -	0.18 -	40.7 UJ
A9P1-C-18-13-2-D	1.351 -	1.101 J	1.141 -	1.101 J	9.428 -	0.191 -	0.041 J	0.268 U	8.1 J	0.13 -	40.6 UJ
A9P1-C-18-14-2	1.319 -	1.128 J	1.12 -	1.128 J	12.863 -	0.173 -	0.049 J	0.282 U	10.3 J	0.033 U	42.6 UJ
A9P1-C-18-16-2	1.446 -	1.246 J	1.225 -	1.246 J	10.212 -	0.217 -	0.033 J	0.262 U	9.37 J	0.031 U	42.2 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.463 @	1.295 @	1.250 @	1.295 @	13.621 @	0.217 @	0.049 @	0.141 @	10.3	0.18 @	21.4 @
Standardized Skewness	--	--	--	--	--	--	--	--	-0.13	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	0.957	--	--
Test Procedure	--	--	--	--	--	--	--	--	t-Test (N)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	3	12	0	11	12
Estimated Mean**	--	--	--	--	--	--	--	--	7.66	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	8.23	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	4	--	--
Size Calculation	--	--	--	--	--	--	--	--	Pass	--	--

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Certification Unit 19

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-19-2-2	1.351 -	1.203 -	1.219 -	1.203 -	6.336 -	0.116 -	0.025 UJ	0.252 U	4.66 J	0.15 -	41.2 UJ
A9P1-C-19-2-2-D	1.43 -	1.239 -	1.217 -	1.239 -	4.865 J	0.103 J	0.027 UJ	0.27 U	6.75 J	0.16 -	42.5 UJ
A9P1-C-19-3-2	1.358 -	1.162 -	1.161 -	1.162 -	9.402 -	0.135 -	0.032 J	0.24 U	4.46 J	0.11 -	40.8 UJ
A9P1-C-19-4-2	1.445 -	1.207 -	1.191 -	1.207 -	6.139 -	0.172 -	0.025 J	0.264 U	4.01 J	0.22 -	41.6 UJ
A9P1-C-19-5-2	1.3 -	1.142 -	1.114 -	1.142 -	10.348 -	0.182 -	0.036 J	0.259 U	4.25 J	0.1 -	42 UJ
A9P1-C-19-6-2	1.364 -	1.164 -	1.139 -	1.164 -	9.129 -	0.076 U	0.028 J	0.329 J	4.4 J	0.09 -	42.7 UJ
A9P1-C-19-8-2	1.351 -	1.165 -	1.157 -	1.165 -	11.548 -	0.201 -	0.032 J	0.24 U	5.02 J	0.1 -	41.8 UJ
A9P1-C-19-9-2	1.244 -	1.128 -	1.075 -	1.128 -	11.197 -	0.183 -	0.054 J	0.258 U	4.72 J	0.61 -	41.4 UJ
A9P1-C-19-10-2	1.327 -	1.11 -	1.113 -	1.11 -	6.557 -	0.099 J	0.026 J	0.298 J	5.29 J	0.13 -	42.2 UJ
A9P1-C-19-12-2	1.394 -	1.108 -	1.082 -	1.108 -	8.293 -	0.142 -	0.037 J	0.323 J	4.79 J	0.34 -	41.4 UJ
A9P1-C-19-13-2	1.406 -	1.098 -	1.069 -	1.098 -	12.528 -	0.241 -	0.048 J	0.386 -	5.47 J	0.23 -	41.8 UJ
A9P1-C-19-15-2	1.296 -	1.05 -	1.013 -	1.05 -	9.34 -	0.15 -	0.031 J	0.234 U	3.05 J	0.05 J	41.3 UJ
A9P1-C-19-16-2	1.392 -	1.154 -	1.127 -	1.154 -	11.093 -	0.22 -	0.042 J	0.249 U	3.78 J	0.19 -	42.9 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.445 @	1.239 @	1.219 @	1.239 @	12.528 @	0.241 @	0.054 @	0.386 @	6.75 @	0.61 @	21.5 @
Standardized Skewness	--	--	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	1	1	8	0	0	12
Estimated Mean**	--	--	--	--	--	--	--	--	--	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--	--	--
Size Calculation	--	--	--	--	--	--	--	--	--	--	--

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Certification Unit 20

Station Number	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Strontium-90	Technetium-99	Arsenic	Beryllium	Aroclor-1260
A9P1-C-20-1-2	1.35 -	1.154 -	1.128 -	1.154 -	11.155 -	0.283 -	0.058 J	0.261 U	5.18 J	0.19 -	43.4 UJ
A9P1-C-20-1-2-D	1.411 -	1.209 -	1.185 -	1.209 -	11.144 -	0.191 -	0.084 J	0.384 J	4.76 J	0.07 -	41.8 UJ
A9P1-C-20-2-2	1.524 -	1.201 -	1.194 -	1.201 -	7.466 -	0.244 -	0.04 J	0.409 -	6.9 J	0.3 -	41.6 UJ
A9P1-C-20-3-2	1.6 -	1.168 -	1.138 -	1.168 -	12.448 -	0.192 -	0.034 UJ	0.264 U	4.94 J	0.24 -	40 UJ
A9P1-C-20-5-2	1.404 -	1.239 -	1.254 -	1.239 -	4.669 J	0.191 -	0.039 J	0.25 U	4.64 J	0.08 -	41.3 UJ
A9P1-C-20-7-2	1.408 -	1.193 -	1.157 -	1.193 -	12.119 -	0.174 -	0.035 UJ	0.268 U	5.04 J	0.1 -	40.8 UJ
A9P1-C-20-8-2	1.441 -	1.317 -	1.252 -	1.317 -	11.623 -	0.211 -	0.032 J	0.27 U	5.47 J	0.22 -	41.1 UJ
A9P1-C-20-9-2	1.358 -	1.167 -	1.102 -	1.167 -	7.921 -	0.129 -	0.044 UJ	0.246 U	4.25 J	0.023 U	41.6 UJ
A9P1-C-20-10-2	1.453 -	1.323 -	1.312 -	1.323 -	4.504 J	0.121 J	0.034 UJ	0.263 U	9.6 J	0.2 -	40.4 UJ
A9P1-C-20-11-2	1.294 -	1.173 -	1.059 -	1.173 -	10.591 -	0.168 -	0.037 J	0.253 U	6.04 J	0.3 -	41.2 UJ
A9P1-C-20-13-2	1.359 -	1.159 -	1.186 -	1.159 -	14.982 -	0.229 -	0.055 J	0.411 -	5.92 J	0.1 -	41.1 UJ
A9P1-C-20-15-2	1.469 -	1.198 -	1.168 -	1.198 -	10.394 -	0.164 -	0.044 UJ	0.257 J	5.12 J	0.15 -	41.4 UJ
A9P1-C-20-16-2	1.417 -	1.195 -	1.18 -	1.195 -	12.051 -	0.236 -	0.042 UJ	0.294 J	7.09 J	0.29 -	41.3 UJ
FRL	1.5	1.4	1.5	1.4	50	0.82	0.61	1	9.6	0.62	40
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	ug/kg
Confidence Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max Result	1.6	1.323 @	1.312 @	1.323 @	14.982 @	0.283 @	0.084 @	0.411 @	9.6	0.30 @	21.7 @
Standardized Skewness	0.88	--	--	--	--	--	--	--	2.39	--	--
W-Statistic Probability *	0.835	--	--	--	--	--	--	--	0.253	--	--
Test Procedure	t-Test (LN)	--	--	--	--	--	--	--	t-Test (LN)	--	--
Sample Size	12	12	12	12	12	12	12	12	12	12	12
Number of NDs	0	0	0	0	0	0	6	7	0	1	12
Estimated Mean**	1.43	--	--	--	--	--	--	--	5.85	--	--
UCL of the Mean	1.47	--	--	--	--	--	--	--	6.43	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
2x Rule - Pass / Fail	Pass	--	--	--	--	--	--	--	Pass	--	--
a posteriori Sample	9	--	--	--	--	--	--	--	2	--	--
Size Calculation	Pass	--	--	--	--	--	--	--	Pass	--	--

000040

4494

4494

Station Number	Beryllium
A9P1-C-7-1-2	0.32 J
A9P1-C-7-2-2	0.06 J
A9P1-C-7-3-2	0.229 J
A9P1-C-7-4-2	0.023 UJ
A9P1-C-7-5-2	0.023 UJ
A9P1-C-7-6-2	0.05 J
A9P1-C-7-7-2	0.023 UJ
A9P1-C-7-8-2	0.03 J
A9P1-C-7-9-2	0.19 J
A9P1-C-7-10-2	0.34 J
A9P1-C-7-11-2	0.363 J
A9P1-C-7-12-2	0.023 UJ
A9P1-C-7-13-2	0.025 UJ
A9P1-C-7-13-2-D	0.08 J
A9P1-C-7-14-2	0.152 J
A9P1-C-7-15-2	0.023 UJ
A9P1-C-7-16-2	0.023 UJ
FRL	0.62
Units	mg/kg
Confidence Level	90%
Max Result	0.363 @
Standardized Skewness	--
W-Statistic Probability *	--
Test Procedure	--
Sample Size	16
Number of NDs	6
Estimated Mean**	--
UCL of the Mean	--
Non-Parametric Prob.	--
Est. Mean - Pass / Fail	--
2x Rule - Pass / Fail	--
a posteriori Sample	--
Size Calculation	--

Station Number	Radium-226
A9P1-C-6-1-2	1.367 -
A9P1-C-6-2-2	1.394 -
A9P1-C-6-3-2	1.537 -
A9P1-C-6-5-2	1.361 -
A9P1-C-6-7-2	1.442 -
A9P1-C-6-8-2	1.367 -
A9P1-C-6-9-2	1.456 -
A9P1-C-6-9-2-D	1.328 -
A9P1-C-6-10-2	1.321 -
A9P1-C-6-11-2	1.545 -
A9P1-C-6-13-2	1.651 -
A9P1-C-6-15-2	1.598 -
A9P1-C-6-16-2	1.491 -
A9P1-C-6-17-2	1.396 -
A9P1-C-6-18-2	1.507 -
A9P1-C-6-19-2	1.643 -
A9P1-C-6-20-2	1.789 -
A9P1-C-6-21-2	1.403 -
A9P1-C-6-21-2-D	1.365 -
A9P1-C-6-22-2	1.442 -
A9P1-C-6-23-2	1.425 -
A9P1-C-6-24-2	1.634 -
A9P1-C-6-25-2	1.414 -
A9P1-C-6-26-2	1.423 -
A9P1-C-6-27-2	1.545 -
A9P1-C-6-28-2	1.560 -
A9P1-C-6-29-2	1.764 -
A9P1-C-6-30-2	1.402 -
A9P1-C-6-31-2	1.646 -
A9P1-C-6-32-2	1.768 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.789
Standardized Skewness	1.49
W-Statistic Probability *	7.3% (LN)
Test Procedure	Lognormal
Sample Size	28
Number of NDs	0
Estimated Mean**	1.51
UCL of the Mean	1.55
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	4306 Fail

Station Number	Radium-226
A9P1-C-8-1-2	1.392 -
A9P1-C-8-2-2	1.387 -
A9P1-C-8-3-2	1.487 -
A9P1-C-8-4-2	1.361 -
A9P1-C-8-4-2-D	1.428 -
A9P1-C-8-5-2	1.339 -
A9P1-C-8-6-2	1.362 -
A9P1-C-8-7-2	1.387 -
A9P1-C-8-8-2	1.584 -
A9P1-C-8-9-2	1.551 -
A9P1-C-8-10-2	1.467 -
A9P1-C-8-11-2	1.295 -
A9P1-C-8-12-2	1.727 -
A9P1-C-8-13-2	1.634 -
A9P1-C-8-14-2	1.460 -
A9P1-C-8-15-2	1.352 -
A9P1-C-8-16-2	1.574 -
A9P1-C-8-17-2	1.427 -
A9P1-C-8-18-2	1.514 -
A9P1-C-8-19-2	1.401 -
A9P1-C-8-20-2	1.328 -
A9P1-C-8-20-2-D	1.411 -
A9P1-C-8-21-2	1.260 -
A9P1-C-8-22-2	1.384 -
A9P1-C-8-23-2	1.205 -
A9P1-C-8-24-2	1.334 -
A9P1-C-8-25-2	1.392 -
A9P1-C-8-26-2	1.545 -
A9P1-C-8-27-2	1.441 -
A9P1-C-8-28-2	1.374 -
A9P1-C-8-29-2	1.611 -
A9P1-C-8-30-2	1.548 -
A9P1-C-8-31-2	1.428 -
A9P1-C-8-32-2	1.539 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.727
Standardized Skewness	0.76
W-Statistic Probability *	93.5% (LN)
Test Procedure	Lognormal
Sample Size	32
Number of NDs	0
Estimated Mean**	1.45
UCL of the Mean	1.48
Non-Parametric Prob.	--
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample	25
Size Calculation	Pass

Station Number	Radium-226
A9P1-C-10-1-2	1.341 -
A9P1-C-10-2-2	1.505 -
A9P1-C-10-3-2	1.560 -
A9P1-C-10-4-2	1.513 -
A9P1-C-10-5-2	1.379 -
A9P1-C-10-6-2	1.419 -
A9P1-C-10-7-2	1.450 -
A9P1-C-10-8-2	1.522 -
A9P1-C-10-9-2	1.569 -
A9P1-C-10-10-2	1.632 -
A9P1-C-10-11-2	1.306 -
A9P1-C-10-12-2	1.536 -
A9P1-C-10-12-2-D	1.481 -
A9P1-C-10-13-2	1.490 -
A9P1-C-10-14-2	1.349 -
A9P1-C-10-15-2	1.467 -
A9P1-C-10-16-2	1.386 -
A9P1-C-10-17-2	1.345 -
A9P1-C-10-18-2	1.425 -
A9P1-C-10-18-2-D	1.396 -
A9P1-C-10-19-2	1.573 -
A9P1-C-10-20-2	1.529 -
A9P1-C-10-21-2	1.247 -
A9P1-C-10-22-2	1.324 -
A9P1-C-10-23-2	1.363 -
A9P1-C-10-24-2	1.524 -
A9P1-C-10-25-2	1.451 -
A9P1-C-10-26-2	1.318 -
A9P1-C-10-27-2	1.465 -
A9P1-C-10-28-2	1.410 -
A9P1-C-10-29-2	1.557 -
A9P1-C-10-30-2	1.596 -
A9P1-C-10-31-2	1.616 -
A9P1-C-10-32-2	1.403 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.632
Standardized Skewness	-0.27
W-Statistic Probability *	0.490
Test Procedure	t-Test (LN)
Sample Size	32
Number of NDs	0
Estimated Mean**	1.46
UCL of the Mean	1.49
Non-Parametric Prob.	--
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	30
	Pass

Station Number	Radium-226
A9P1-C-11-1-2	1.481 -
A9P1-C-11-2-2	1.408 -
A9P1-C-11-3-2	1.413 -
A9P1-C-11-5-2	1.461 -
A9P1-C-11-7-2	1.394 -
A9P1-C-11-8-2	1.541 -
A9P1-C-11-10-2	1.432 -
A9P1-C-11-11-2	1.638 -
A9P1-C-11-12-2	1.489 -
A9P1-C-11-13-2	1.318 -
A9P1-C-11-15-2	1.465 -
A9P1-C-11-16-2	1.509 -
A9P1-C-11-16-2-D	1.530 -
A9P1-C-11-17-2	1.413 -
A9P1-C-11-18-2	1.432 -
A9P1-C-11-19-2	1.551 -
A9P1-C-11-20-2	1.600 -
A9P1-C-11-21-2	1.328 -
A9P1-C-11-22-2	1.397 -
A9P1-C-11-23-2	1.351 -
A9P1-C-11-24-2	1.283 -
A9P1-C-11-25-2	1.291 -
A9P1-C-11-26-2	1.325 -
A9P1-C-11-26-2-D	1.423 -
A9P1-C-11-27-2	1.568 -
A9P1-C-11-28-2	1.561 -
A9P1-C-11-29-2	1.475 -
A9P1-C-11-30-2	1.479 -
A9P1-C-11-31-2	1.526 -
A9P1-C-11-32-2	1.455 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.638
Standardized Skewness	-0.10
W-Statistic Probability *	83.8% (N)
Test Procedure	Normal
Sample Size	28
Number of NDs	0
Estimated Mean**	1.45
UCL of the Mean	1.48
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample Size Calculation	26 Pass

Station Number	Arsenic
A9P1-C-12-1-2	14.1 J
A9P1-C-12-2-2	5.95 J
A9P1-C-12-3-2	7.28 -
A9P1-C-12-4-2	7.2 J
A9P1-C-12-5-2	9.2 -
A9P1-C-12-6-2	10.7 J
A9P1-C-12-6-2-D	9.95 J
A9P1-C-12-7-2	11.7 J
A9P1-C-12-8-2	13.9 J
A9P1-C-12-9-2	9.29 J
A9P1-C-12-10-2	11.0 J
A9P1-C-12-11-2	8.28 -
A9P1-C-12-12-2	8.68 J
A9P1-C-12-13-2	9.29 J
A9P1-C-12-14-2	11.4 J
A9P1-C-12-15-2	11.5 J
A9P1-C-12-16-2	9.68 -
A9P1-C-12-17-2	6.42 -
A9P1-C-12-18-2	2.59 U
A9P1-C-12-19-2	7.3 -
A9P1-C-12-20-2	4.69 J
A9P1-C-12-21-2	6.43 -
A9P1-C-12-22-2	5.5 -
A9P1-C-12-23-2	8.99 J
A9P1-C-12-24-2	7.89 -
A9P1-C-12-25-2	6.9 J
A9P1-C-12-26-2	6.58 J
A9P1-C-12-27-2	7.15 -
A9P1-C-12-28-2	8.04 J
A9P1-C-12-29-2	6.68 -
A9P1-C-12-30-2	8.25 J
A9P1-C-12-30-2-D	7.56 -
A9P1-C-12-31-2	8.43 -
A9P1-C-12-32-2	9.18 -
FRL	9.60
Units	mg/kg
Confidence Level	90%
Max Result	14.1
Standardized Skewness	-0.04
W-Statistic Probability *	52.3% (N)
Test Procedure	Normal
Sample Size	32
Number of NDs	1
Estimated Mean**	8.40
UCL of the Mean	9.00
Non-Parametric Prob.	--
Est. Mean - Pass / Fail	Pass
2x Rule - Pass / Fail	Pass
a posteriori Sample	23
Size Calculation	Pass

Station Number	Radium-226
A9P1-C-14-1-2	1.539 -
A9P1-C-14-2-2	1.626 -
A9P1-C-14-3-2	1.449 -
A9P1-C-14-4-2	1.442 -
A9P1-C-14-5-2	1.534 -
A9P1-C-14-6-2	1.813 -
A9P1-C-14-7-2	1.284 -
A9P1-C-14-8-2	1.618 -
A9P1-C-14-9-2	1.490 -
A9P1-C-14-10-2	1.394 -
A9P1-C-14-11-2	1.576 -
A9P1-C-14-12-2	1.607 -
A9P1-C-14-13-2	1.317 -
A9P1-C-14-14-2	1.588 -
A9P1-C-14-15-2	1.475 -
A9P1-C-14-15-2-D	1.476 -
A9P1-C-14-16-2	1.626 -
A9P1-C-14-17-2	1.535 -
A9P1-C-14-18-2	1.460 -
A9P1-C-14-19-2	1.511 -
A9P1-C-14-20-2	1.572 -
A9P1-C-14-21-2	1.356 -
A9P1-C-14-22-2	1.406 -
A9P1-C-14-23-2	1.335 -
A9P1-C-14-24-2	1.520 -
A9P1-C-14-25-2	1.339 -
A9P1-C-14-26-2	1.488 -
A9P1-C-14-27-2	1.431 -
A9P1-C-14-28-2	1.460 -
A9P1-C-14-29-2	1.444 -
A9P1-C-14-30-2	1.656 -
A9P1-C-14-31-2	1.468 -
A9P1-C-14-31-2-D	1.466 -
A9P1-C-14-32-2	1.442 -
FRL	1.5
Units	pCi/g
Confidence Level	95%
Max Result	1.813
Standardized Skewness	1.05
W-Statistic Probability *	89.7% (LN)
Test Procedure	Lognormal
Sample Size	32
Number of NDs	0
Estimated Mean**	1.49
UCL of the Mean	1.53
Non-Parametric Prob.	- -
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample	739
Size Calculation	Fail

Certification Unit 14A (Subsurface)

ID	DATA
A9P1-C-14A-17	1.636 -
A9P1-C-14A-18	1.733 -
A9P1-C-14A-19	1.145 -
A9P1-C-14A-20	1.284 -
A9P1-C-14A-21	1.551 -
A9P1-C-14A-22	1.656 -
A9P1-C-14A-23	1.303 -
A9P1-C-14A-24	1.478 -
A9P1-C-14A-25	1.499 -
A9P1-C-14A-26	1.592 -
A9P1-C-14A-27	1.802 -
A9P1-C-14A-28	1.725 -
A9P1-C-14A-29	1.178 -
A9P1-C-14A-30	1.540 -
A9P1-C-14A-31	1.437 -
A9P1-C-14A-31-D	1.497 -
A9P1-C-14A-32	1.407 -
A9P1-C-14-10	1.616 -
A9P1-C-14-14	1.790 -
A9P1-C-14-2	1.622 -
A9P1-C-14-8	1.771 -
Limit	1.50
Units	pCi/g
Confidence Level	95%
Max. Result	1.802
Standardized Skewness	-1.162
W-statistic Prob. #	0.281
Test Procedure	t-Test (N)
Sample Size	20
Nondetects	0
Est. Mean*	1.5413
UCL	1.6169
Prob. > Limit	--
Est. Mean - Pass / Fail	Inconclusive
2x Rule - Pass / Fail	Pass
a posteriori Sample	141
Size calculation	Fail

With Additional CU-14 samples			
	Back	A9P1 Wt'd	
Samples		60	
Average		1.525	
Median		1.579	
Std. Dev.		0.135	
Minimum		1.145	
Maximum		1.802	
Lower Quartile		--	
Upper Quartile		--	
UCL-Mean (95%)	1.5635	1.5546	
t-Test Prob.		0.033	Okay @ 5%
W-test (median) P	--	--	

Note: "Wt'd" - Indicates samples have been weighted so each CU is equally represented.

000048

4494

ID	DATA
A9P1-C-6-1	1.367 -
A9P1-C-6-2	1.394 -
A9P1-C-6-3	1.537 -
A9P1-C-6-5	1.361 -
A9P1-C-6-7	1.442 -
A9P1-C-6-8	1.367 -
A9P1-C-6-9/D (1)	1.456 -
A9P1-C-6-10	1.321 -
A9P1-C-6-11	1.545 -
A9P1-C-6-13	1.651 -
A9P1-C-6-15	1.598 -
A9P1-C-6-16	1.491 -
A9P1-C-6-17	1.396 -
A9P1-C-6-18	1.507 -
A9P1-C-6-19	1.643 -
A9P1-C-6-20	1.789 -
A9P1-C-6-21/D (2)	1.403 -
A9P1-C-6-22	1.442 -
A9P1-C-6-23	1.425 -
A9P1-C-6-24	1.634 -
A9P1-C-6-25	1.414 -
A9P1-C-6-26	1.423 -
A9P1-C-6-27	1.545 -
A9P1-C-6-28	1.560 -
A9P1-C-6-29	1.764 -
A9P1-C-6-30	1.402 -
A9P1-C-6-31	1.646 -
A9P1-C-6-32	1.768 -
N	28
Min	1.321
Max	1.789
Mean*	1.511
Std.Dev.*	0.130
CL _(90%)	1.470
UCL _(90%)	1.554
H ₀ : Mean = FRL(1.5)	
Distribution #	Lognormal
Stat / W-Stat	0.189
p-value	0.850
Conclusion	Fail to reject the null hypothesis for alpha = 0.05.

Note: * Est. Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations - original results: (1) 1.328/1.456; (2) 1.365/1.403.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

ID	DATA
A9P1-C-14-1	1.539 -
A9P1-C-14-2	1.626 -
A9P1-C-14-3	1.449 -
A9P1-C-14-4	1.442 -
A9P1-C-14-5	1.534 -
A9P1-C-14-6	1.813 -
A9P1-C-14-7	1.284 -
A9P1-C-14-8	1.618 -
A9P1-C-14-9	1.490 -
A9P1-C-14-10	1.394 -
A9P1-C-14-11	1.576 -
A9P1-C-14-12	1.607 -
A9P1-C-14-13	1.317 -
A9P1-C-14-14	1.588 -
A9P1-C-14-15/D(1)	1.476 -
A9P1-C-14-16	1.626 -
A9P1-C-14-17	1.535 -
A9P1-C-14-18	1.460 -
A9P1-C-14-19	1.511 -
A9P1-C-14-20	1.572 -
A9P1-C-14-21	1.356 -
A9P1-C-14-22	1.406 -
A9P1-C-14-23	1.335 -
A9P1-C-14-24	1.520 -
A9P1-C-14-25	1.339 -
A9P1-C-14-26	1.488 -
A9P1-C-14-27	1.431 -
A9P1-C-14-28	1.460 -
A9P1-C-14-29	1.444 -
A9P1-C-14-30	1.656 -
A9P1-C-14-31/D(2)	1.468 -
A9P1-C-14-32	1.442 -
N	32
Min	1.284
Max	1.813
Mean*	1.494
Std.Dev.*	0.112
LCL _(90%)	1.459
UCL _(90%)	1.529
H ₀ : Mean = FRL(1/5)	
Distribution #	Lognormal
t-Stat / W-Stat	0.530
P-value	0.596
Conclusion	Fail to reject the null hypothesis for alpha = 0.05.

Note: * Est. Mean = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations - original results: (1) 1.475/1.476; (2) 1.468/1.466.
#: This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.